DOMESTIC ENGINEERING

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Do Retailers Figure Their Profits Right?

A manufacturer of store equipment recently caused a question to be printed in a few of the national magazines, business, trade and newspaper publications, designed to find out what percentage of retailers figure their profits right.

The question had to be printed, of course, as an advertisement, even though it was not advertising in itself. Under the question was an offer to send a "48 page book for Retailers" to any retailer who told how he figured the profit problem.

The publications used had a very wide circulation and of course went to a large number of retailers in every part of the United States and Canada. The answers aggregated about 1,000, of which *750 were wrong*. It is hardly believable that 75% of all retailers *do not know how to figure profits*.

Here is the question: "A certain article costs $1 wholesale. What will it have to be sold for to allow a profit of 10%, after allowing 22% for cost of doing business?"

It is a very simple question—one that every retailer has to answer in his own business every day. But *750 out of 1,000 retailers answered it wrong*.

The answers ranged all the way from $1.10 to $1.60. The majority gave the selling price as $1.32 or $1.31, allowing a profit of one cent or less, notwithstanding an explanation at the bottom of the question that the answer was *not* $1.32.

A retailer in Dallas, Texas, answered like this: "In answering your question I will say that if you had not stated that $1.32 was not correct, I would have put that price on the article, for I do not charge any profit on overhead expenses. But if you do, I cannot see any other way of figuring but to charge $1.34 on selling price. Will you please send me your book and please tell me what your selling price is, and oblige."

Is there any wonder that this man was not making money? He was on the straight road to bankruptcy.

Perhaps some of our readers will think that there *would* be a profit in the article at $1.34, and to make sure that they will understand this Texas merchant's state of progress, it is well to explain why and how he was losing money instead of making ten per cent profit as he thought.

If the wholesale price is $1.00 and the cost of doing business 22%, $1.31 does not allow 10%, but only 1.4% profit. On a gross annual business of $15,000 he will *clear* $150 a year, or a little better than $12 a month.

He said that if the ad had not stated that $1.32 was not correct, *he would have put that price on the article*.

Selling the article at $1.32, he would *lose* almost 1% instead of making 10 *per cent*.

His trouble was that he figured his profit and the amount which he wanted to take out for the cost of doing business, or his percentages, on the *cost price* instead of on the *selling* price.

Instead of adding 32% *of* the wholesale cost *to* the wholesale cost he *should* have added 32% of the *selling price* to the wholesale cost.

The wholesale cost is not something to be added to, but a portion of the selling price, in this instance, 68% of the selling price.

If the wholesale cost is 68% of the selling price, then the selling price is evidently $1.47, instead of $1.31, or $1.32.

If the cost of doing business is figured on the selling price, that is, 22% on the gross amount of business done during the year, the cost of selling the article is not 22 cents but *32 1-3* cents.

If 10% profit is desired on the selling price, it is not sufficient to add 10 cents to the cost price. Instead 14.7 cents, nearly 15 cents, must be added.

To prove this, take 22% of $1.47, which is 32.34 cents, and 10% of $1.47, which is 14.7 cents. Add these to $1.00 and you have $1.47.

The foregoing figures should by all means furnish a few *good suggestions to plumbing and heating contractors*. Here you have before you the solution of a problem which is not so much a question of mathematics as of *good business sense*, and you should profit by it accordingly.

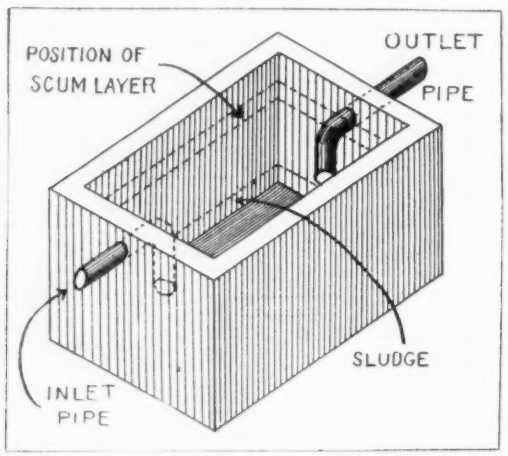
Installing a Small Sewage Disposal Plant

Sewage Disposal for Country Houses—What the Septic Tank Is and Its Limitations—The Three Essentials for Sewage Disposal

By Henry N. Ogden, C. E., Reproduced by Courtesy of "House and Garden."

Under whatever form the problem presents itself, sewage disposal is always a question of so treating a large volume of dirty water that it shall not then or thereafter cause disagreeable odors nor, in special cases, injure the quality of any drinking water into which it may be discharged. For sewage, it must always be remembered, is chiefly water deiled with a small addition of mineral, vegetable and animal matter, the proportion being about one tablespoonful of mineral dirt and one tablespoonful of animal and vegetable matter to a barrelful of water.

The problem consists in removing from the barrel these two tablespoonfuls and doing it in such a way that there shall be no smell occasioned in the process. The cost of the process, moreover, should be reasonable. The method first thought of naturally involved a straining or sieve



The Ordinary Construction of a Septic Tank. Both pipes are bent so that their openings are not clogged by the sediment or scum.

action, but, unfortunately, the solids present are so fine that only a small and almost negligible quantity can be removed in this manner. Even if the strainer is made of the fine sand, the results are not satisfactory, except under certain conditions, chiefly because the greater part of the putrescible material is in solution and therefore goes through the strainer uncaught.

Nature is always a wise teacher, and it needs but moderate observation to show that her method of getting rid of foul organic matter is through the process of decay. No matter whether the waste material is animal, like dead bodies or manure, or is vegetable, like wood or apples, nature, if allowed, starts the process of decay immediately and, sooner or later, only dust remains to show how nature acts to keep her world pure and wholesome. Following this suggestion, sewage disposal should consist not only of the separation of the solids from the polluted water, but also of the properly regulated decay of all the organic matter present, whether solid or liquid, so carried on that the process shall be as inoffensive as possible.

For some years it has been known that decay is the result of the activity of certain bacteria and that their action is most energetic and effective wherever bacteria are best suited with surroundings. It is also known that in the soil, particularly in the surface layers, millions of the right kinds of bacteria are always to be found. Their activity depends both on the amount of organic matter present and on an abundance of air which must be supplied through the voids or pores of the soil. Thus in clay or peaty soils, with the inevitable absence of voids, no bacterial action is possible, because the essential air is lacking.

When one attempts to make use of soil bacteria in purifying sewage, the difficulty arises that their action requires time, and it has been proved that pouring sewage continuously in large quantities through or onto a coarse sandy soil is a failure because the bacteria become overworked. They may even be drowned and the soil then becomes choked with a putrid mass. On the other hand, properly managed, with due reference to the needs of the bacteria, such a soil will not only strain out the solids, but will also effectually reduce the organic matter, both solids and liquids, to an inoffensive residue.

Three essential conditions have been worked out by the aid of which sewage disposal on the soil becomes scientifically possible, and it has become equally established that only by the aid of the soil can sewage disposal be made practically successful. These three conditions are, first, a rate of application suitable to the soil available, and second, an interrupted or intermittent delivery of the sewage so that the bacteria can, as it were, breathe between the applications of liquid and, third, a resting period in which the process of decay is carried forward and perfected. There is, besides the practical necessity of getting a large volume of water through the soil, a necessity which prevents the use of fine sand or silt as well as of clay and suggests the use of very coarse material.

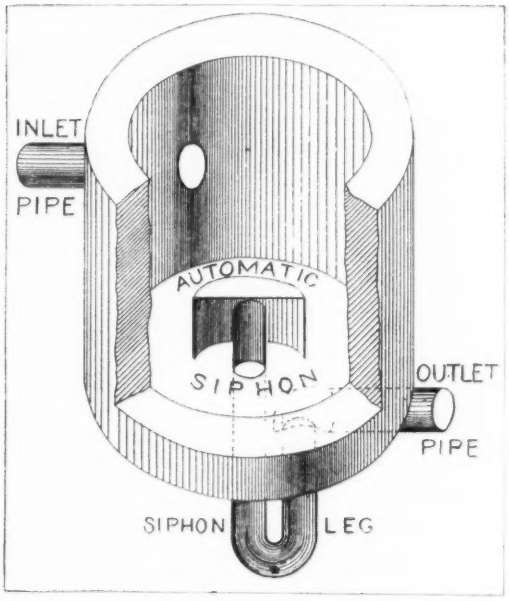
Taking up the question of rate of application, it has been found that a sandy soil in which the grains are all, as nearly as may be the same size, and which contains no clay or fine dust, makes the best sort of soil for treating sewage. On such soil sewage will be cared for without offense at the rate of ten gallons of sewage per square yard of surface, or, since each person of a family in which water is used freely requires about thirty gallons of water a day—most of which is converted into sewage—the soil area should be at the rate of three square yards to each person. A depth of about three feet is all that can be utilized, and if no suitable soil is available an artificial sand bed can be made by hauling in sand until the proper area is provided. If the particles are made coarser, so that the liquid runs more easily, the rate can be increased. Thus, with an artificial bed made of gravel or broken stone, whose particles are all about the size of peas, the sewage can be applied at nine times the rate given above, or one square yard will serve for three persons. If the artificial soil is made up of stones as large as hickory nuts, two hundred gallons may be applied daily to each square yard, or one square yard will serve for six persons.

The second requirement is secured by discharging the

sewage onto the beds at intervals, the number of doses per day depending on the size of the particles in the bed. Thus it is customary to run the proper dose onto the sand bed three times a day, making each dose one-third of the total daily amount. As the size of the constituent particles in the soil increases, the amount of the dose must be decreased and the frequency of the doses increased, in order to keep the beds effective and in good order. Thus with pea gravel one hour intervals and doses of an amount equal to one twenty-fourth of the daily volume are required. With nut gravel the three intervals between doses is shortened to five minutes and the amount of the dose is decreased to correspond.

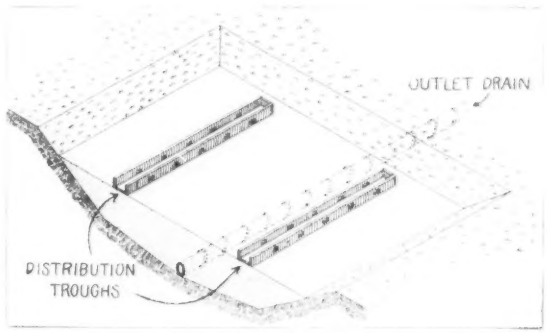
The third requirement is met by providing an additional area over that theoretically required and by shifting the flow occasionally onto this extra area. This can be done most economically by dividing the regular area into three beds and then each day shifting the flow from bed to bed in regular rotation with eight-hour periods of flow on each part. If the additional area is made equal to one of these parts, it is a simple matter to have three beds always working and one always resting. By letting each quarter rest one day in four, the greatest possible life is secured for the plant.

A certain difficulty has been found in operating a plant as described from the fact that there is present in fresh sewage a certain amount of greasy, slimy matter which tends to clog the surface of the disposal beds, so that, even with intermittent treatment and alternate use the air cannot penetrate to the interior of the beds, and a treatment otherwise properly designed thus becomes a



The Intermittent Flow Chamber. The syphon regulates the liquid flowing during the day so that the chamber will discharge the right amount at intervals.

source of annoyance and the process a failure. In order to avoid such surface clogging, it is customary to run the sewage through a tank with a trapped inlet and outlet, thereby removing both the grease and a large part of the solids carried. Such a tank should hold from one to two days' flow—that is, for a family of ten persons, using water at the rate of thirty gallons each per day, the tank should have a capacity of from three hundred to four hundred gallons. Three hundred gallons is forty cubic feet, so that a tank three feet wide, three feet deep and five feet long would fulfill the requirements. It has been thought that, since there has been found to be a certain disintegrating action going on in this tank, merely passing sewage through such a tank would constitute a purification process. Under the name of septic tank many extravagant claims have been made for its use-



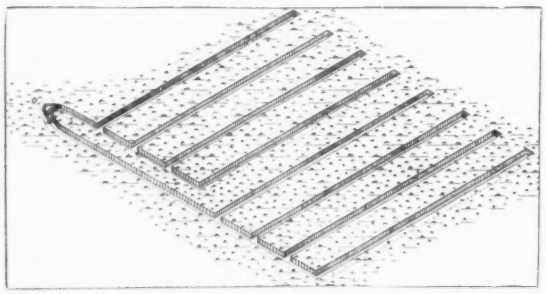
In the filter bed the wooden troughs spread the liquid evenly over the sand. The walls slope so that the filtered liquid may be drained off from the bottom of the excavation.

fulness, some writers even going so far as to say that by passing through such a tank the foulest sewage would be converted into the equivalent of spring water. But such claims cannot be substantiated in practice, and the most that such a tank can do is to hold back grease and to diminish somewhat the quantity and to modify partially the character of the suspended solids, the latter action being due to the bacteria in the tank itself. It is desirable, in order to serve its capacity, to clean out the tank once a year, although there are instances of tanks going five or six years untouched. In such cases it will usually be found that the tank has filled up to such an extent that no deposits take place as the sewage hurries through the tank in the small channel that the accumulated solids have left. During the first month of operation the tank may smell, so that it is desirable to put it underground and provide no ventilation. After a time, however, a thick, leathery scum forms on the surface of the liquid and then no further danger of smell need be feared. When the tank is cleaned, the water is drawn off and the scum together with the bottom deposit is shoveled out, carried away and either buried or used as fertilizer.

Between the tank and the beds there should be placed a tank or chamber for the express purpose of converting the regular flow of the sewage into an intermittent flow so essential for the well-being of the beds. The size of this tank, as indicated above, depends on the size of the particles in the beds, ranging from a capacity of one-third the daily flow to one two-hundredth of the daily flow. The intermittence is secured by means of a flushing syphon, to be bought from one of the several makers of such apparatus. The syphon operates only when the flow line in the chamber has reached a certain height. Then in a few seconds the entire contents are discharged, to be repeated when the tank is again filled. By properly choosing the size of this chamber and selecting the proper flushing for that size, the dose may be made anything desired.

In order to make clear the application of what has been written and exemplified by a definite installation, the following description of the drawings shown in figures 1 to 5 may now be given:

The illustration shows the ordinary construction of a septic tank, the cover, however, being omitted. The inlet pipe shown on the left is provided with an elbow, so that the entering sewage passes into the tank about half way between the water level and the bottom. Similarly, the outlet pipe has an elbow, so that the sewage going out is freed as much as possible both from the bottom sediment and from the floating matter on the surface. Care



Ditches are sometimes dug according to this plan, when the soil works well and is loamy. At the extreme left of the drawing is the manhole which can regulate the flow from one set of trenches to the other.

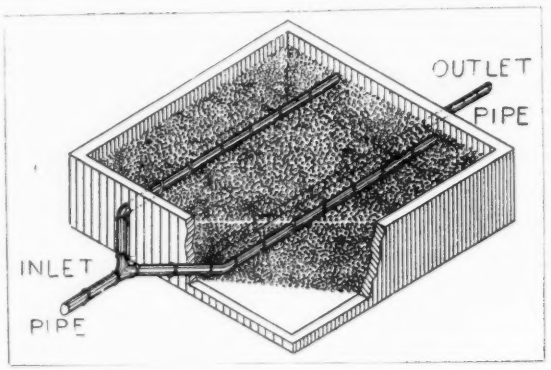
must be taken to place the horizontal part of the outlet pipe at the proper elevation, since this determines the level of the water within. The bottom and sides should be of concrete about six inches thick and the sewer pipes four inches in diameter. In order to vary the capacity of the tank, the length and width may be changed, although it is better not to exceed six feet in width.

The automatic chamber for the purpose of providing the intermittent flow, as will be seen from the drawing, consists ordinarily of a circular well, at the bottom of which is installed the cast iron mechanism for discharging the sewage which enters the chamber. The inlet pipe coming from the sedimentation tank is usually above the level which the sewage reaches in the chamber. The automatic syphon should be placed before the bottom of the chamber is laid and it is best to set it in concrete before any construction on the chamber is started. The outlet pipe should extend to the filter beds and to the irrigation fields. The syphon apparatus may be purchased from several manufacturers of plumbing supplies.

The figure shows a sand filter bed, the inlet half removed being the excavation filled with three feet of sand. In the center of the bed is a six inch sewer pipe to carry away the filtered sewage. On the surface are two rows of wooden troughs with holes two feet apart in order to allow the entering sewage to be distributed over the surface of the sand. It would be desirable to surround the outlet drain under the sand with a four inch layer of broken stone or gravel in order that the entrance of the sand into the pipe may be prevented. It would be necessary, perhaps, to rake up the surface of the sand once a month in order to loosen the greasy scum which will be found to form. In winter it is desirable to run a furrow across the bed in front of each opening from the trough. The sewage is thus concentrated in the bottom of a narrow ditch and in this way the ground is kept warm by the heat of the sewage and little or no difficulty from freezing is experienced.

Where broken stone or screened gravel is used for purifying sewage, a different plan is pursued, as shown in the drawing. The inlet pipe is divided into two lines on the surface of the stone, the sewage entering the bed from the joints which are left open underneath. If the size of this stone is kept small—that is, not greater than ordinary peas—the sewage may be discharged onto the surface from the syphon chamber and the effluent, while not purified as well as if sand were the filter medium yet will be sufficiently improved to be discharged into any surface stream. If the material is coarser than peas, a valve must be placed on the outlet pipe just inside the wall of the chamber shown and the valve closed when sewage is admitted. Then, if the sewage is allowed to stand in the bottom for an hour and then slowly withdrawn through the outlet valve, it will be found to have been purified far more than if allowed to run directly through the broken stone. With such method of operation, the walls and bottom of the chamber must be of concrete, and such a correspondence between the size of the syphon chamber and this stone filter must be observed that time enough will be given to the filter to stand full at least one hour while the syphon chamber is filling.

Sometimes a level area laid out in ditches is used for subsurface irrigation. As will be noted in the drawing, the pipe from the syphon chamber enters a manhole at the extreme left, from which two trenches have been dug, each connecting with four cross lines. The trenches should not be more than a foot deep and should be long enough so that at least forty lineal feet of trench will be provided for each member of the family. The grade of the shallow trenches should vary between one foot in two hundred and one foot in five hundred, the greater grade being used with the coarser soil. The tile pipe placed in these trenches (not shown in the drawing) should be four inch agricultural tile, octagonal outside and circular inside. The joints are covered on top with a piece of heavy paper, and it will be found that the entering sewage will escape through the joints in proper and sufficient quantities. The drawing shows two systems, both connected with the manhole, so arranged that alternate and intermittent use from day to day of each section may be practiced. The writer has found that this arrangement works well in any loamy soil and will continue to work



Where broken stone or gravel is used, the inlet pipe is divided into two lines on the surface of the stone. The sewage is discharged from openings in the bottom of these pipes.

even through the severest winter. The tile from the manhole connecting with the agricultural tile should be sewer pipe with cemented joints, and it is very desirable that the grades should be so arranged that equal amounts of sewage may pass into each one of the connecting lines.

Which of the methods of purification suggested shall be adopted in any particular case will depend upon local

conditions to such an extent that it is impossible to say which of the three given here should preferably be adopted. If it is found that below the surface soil sand has been deposited by nature, a sand filter would naturally be adopted. If sand or gravel has to be hauled, then fine broken stone is less expensive, because of the high rate which can be used with such a filtering medium. If the ground level is horizontal and sufficiently convenient to the house, particularly if the soil is a sandy loam, then the method of subsurface irrigation would naturally be suggested. In all cases it must be remembered that the process is a delicate adjustment between conditions favoring the growth and development of certain bacteria and other conditions which lend themselves to their destruction. The sewage disposal plant, when constructed, is therefore not to be neglected, but must be carefully inspected to make sure that the automatic syphon is working properly, that there is no surface clogging on the beds and that the appearance of the filtered effluent is satisfactory. With a reasonable amount of intelligence used in the construction and in the maintenance of the plant, there is no reason why the matter of sewage disposal, after the original installation, should ever be a cause of worry, but it may be expected that the household wastes will be taken care of in such a way as to be out of sight if not out of mind.

OMAHA PLUMBING CONCERN BUSY ON LARGE CONTRASTS.

The Western Plumbing and Heating Co., of Omaha, Nebr., reports an exceptionally busy season for its concern. This company recently completed the installation of the plumbing, heating and ventilating appliances in the new Omaha high school, at a contract figure of approximately $100,000. This contract is reported as being the largest and most successful plumbing, heating and ventilating contract ever handled by a single concern in the city of Omaha.

The same concern also reports that it has completed the plumbing and heating work on the new Flat Iron building located at St. Mary's Avenue and 17th Street in the city of Omaha, at a contract figure of $20,000.

A photographic reproduction of the Western Plumbing & Heating Company's display room is shown on this page. This show room alone indicates that this concern is decidedly successful in the plumbing and heating trades.

The Up-to-Date Show Room of the Western Plumbing and Heating Co., Omaha, Neb.

Vicksburg, Miss.—W. H. Bruser has the contract for the heating, plumbing, and drainage in the new residence of Mr. Al Fischel; also for the new dyeing and cleaning establishment being built on South street.

Norfolk, Va.—Thornton & Williams have been awarded the contract for the plumbing work on the seventeen-story Heard bank building at Jacksonville, Fla. The contract amounts to $53,000.

Long Beach, Cal.—The contract for plumbing on the Mercantile building has been awarded to W. B. McKinley, amounting to $685.

Cedar Rapids, Ia.—John Darragh and Anthony Loufek have formed a partnership and opened an up-to-date plumbing establishment at 74 Sixteenth Avenue West.

UNIQUE PLAN TO SOLVE WATER SUPPLY PROBLEM.

Santa Monica, Cal., is considering a unique plan for solving a serious water problem. The supply is already inadequate and an application for a part of the Owens river from Los Angeles has not been granted. Now it is proposed to distill ocean water for domestic purposes, and the municipality may purchase the "Burning mountain," several miles up the coast in the Santa Monica range for use as a heating plant. It is believed the sea water could be carried through a "U" pipe deep to the hot interior of the smoking hill and distilled at practically no cost. Power might be produced, some engineers think, that would enable the municipality to maintain an electric lighting plant.

Scientific Management Applied to the Heating Industry

How the Anatomy, the Physical Strength and the Peace of Mind of the Worker Affect His Work.

By Chas. S. Kellum, M. E.

(Continued.)

Having surveyed in brief those elements which united make up the conditions under which the man does the work, let us turn to the man and see what variable factors are contained in him and how they affect his productive labor. The variables of any body of workers may be classified as:

1. Anatomy; 2. Physical Strength; 3. Peace of Mind; 4. Temperament; 5. Experience; 6. Age; 7. Income.

Anatomy.

A careful study of the anatomy of the worker will enable us to adapt his work, equipment and surroundings to him. This will help him to eliminate the unnecessary motions that he makes in the performance of his task and will make the necessary motions less fatiguing and more effective. Take for example a left-handed workman; his position relative to a right-handed man is reversed and calculation should be made accordingly. A short man cannot work as advantageously at a bench or a working table of a height suitable to a tall man, and it has been found that increased results have been obtained by selecting men who vary little as to height to work side by side. Men cutting pipe should be paired as to height, reach and weight as nearly as possible, for reach and weight being equal the heavier man will have the advantage, the force of gravity, being a constant.

A good classification of men as to anatomy may be seen in the leading ball teams of the country where unconsciously these principles of selection have been worked out. Each of the nine positions on a number of teams are filled with men of similar anatomy. The pitchers are usually tall, of long reach and slender build. Catchers are short and heavy with frames well knit and close to the ground, while basemen and fielders are each examples of anatomical classification relative to specialized work. The prize ring on the other hand offers many fine examples of the relative advantages of height, weight and reach.

Physical Strength.

Physical strength is that quality of man which enables him to do productive work. Work in a physical sense is accomplished when force acts upon a material body and moves that body in the direction of the line of action of the force. This is encompassed in the formula $W = F$ where W = work, F = force and S = the distance a body is moved in the direction of the force. Now, if on a certain task a body of workers are taught to work alike in every detail of motion and position, it is evident that S being constant, the result W will depend upon the F or strength of each individual worker.

Astute managers are quick to grade their workmen with reference to physical strength, for they realize what a valuable asset brawn is in overcoming the resistance of material and the ravages of fatigue. Many men who give but mediocre results at tasks which require great strength, have proven highly efficient when set to work on operations that are more intricate and less fatiguing.

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Peace of Mind.

Peace of mind is largely under the control of the management, and it should be the aim of every employer of labor to keep the workers contented. Contentment serves to promote faith and makes the worker feel that he is an integral part in all the failures and successes of his employers. The contented workman respects and protects the property of his employer, feeling as he does, that what belongs to the firm in a way belongs to him. Contentment does not mean lack of ambition. Ambition is a valuable asset to a man—it acts as a driving power to all his efforts—and the wise employer always devises ways and means to reward faithful service and to meet the ambitions of his intelligent men.

Nothing gives a workman greater peace of mind than the knowledge from day to day as to just what he is doing relative to what is expected of him. I saw this clearly illustrated in a certain foundry not long ago. It seems that each molder was expected to put up a certain number of flasks each day with a loss not to exceed 6 per cent. Now these molders being mostly foreigners were in absolute ignorance as to how many molds were lost in the pouring in the number that they put up each day. The foreman scolded and swore about each man's loss and the men, believing that the foreman was wrong, became convinced that he was trying to mistreat them. The foreman himself had no actual record of the loss only as he estimated each day, and he therefore was able only in a general and hazy sort of a way to tell whether certain of his men were improving in their work or not. About this time the superintendent—a man skilled in production and human nature—stepped in and applied the graphical chart system to each molder; that is, he hung a piece of co-ordinate or cross section paper tacked upon it. On this co-ordinate paper two curves were run; one showing the number of molds put up each day and one the number lost each day. Straight lines indicated what was expected in both number and loss. It is needless to say that these simple charts which were easily understood by the men not only stopped all argument but showed each man exactly how he was meeting the requirements, and convinced him that he was being justly treated. In a short time there was established a friendly rivalry to keep up the production and to keep down the loss, and at the end of the week the men's names were posted in the foundry in their relative order as to production and loss. By this simple step the management fanned into flame the latent enthusiasm that each molder had in his work to such an extent that in a few months the production increased 60 per cent while the loss remained at 6 per cent—no more men being added to the force.

Similar instances of the value of peace of mind could be multiplied, and a little thought will lead to the only possible conclusion: that no man can give the most of himself to his work unless he is well disposed towards his employer with his mind not harassed by discontent with his lot.

(To be Continued.)

Air-Conditioning Apparatus—Principles Governing Its Application and Operation

By Willis H. Carrier, Buffalo, N. Y., Associate Member of A. S. M. E., and Frank L. Busey, M. E., Buffalo, N. Y.

(Continued)

The Dehumidifier.

In the dehumidifier (Figs. 8 and 9) relatively cold spray water is used to condense the moisture out of the air. This water is either refrigerated or taken from an artesian well. When the water is artificially cooled the refrigerating coils are usually placed in a chamber underneath the spray chamber, and the water is so distributed as to flow uniformly over the cold surface, dropping to the tank underneath. The dehumidifier has its sprays opposed to the direction of air flow as in the humidifier, but differs from the latter in having usually two sets of sprays in series instead of one. Two or more dehumidifiers are frequently placed in series when the range of air temperature is great or when an economy of cooling water is essential.

Rotary Strainer.

Whenever the air handled by air-conditioning apparatus is full of impurities, such as lint in textile mill applications, the ordinary type of strainer would require too much attention and an automatic, self-cleaning rotary strainer, shown in Fig. 10, is essential. This consists of a fine-mesh brass or copper screen, covering a cylindrical drum. As this drum rotates it is cleaned at the water surface by a revolving brush. The use of this strainer is of great advantage in humidifiers, since it permits the use of smaller nozzles which give a more finely divided spray, with increased efficiency.

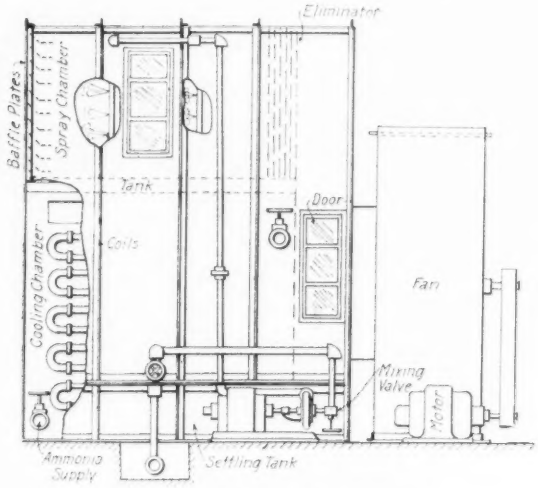


Fig. 8. Sectional View of Dehumidifier.

Dewpoint Method of Humidity Control.

Any one of the three spray types of air conditioners previously described are admirably adapted for humidity control by what is known as the dewpoint method. This system is applicable only where the absolute moisture content of the air in the room is unaffected to any great extent by extraneous sources of moisture supply or by moisture absorption. It depends upon supplying the enclosure with conditioned air having a definite dewpoint and maintaining a predetermined relationship between this dewpoint temperature and the room temperature. The dewpoint of the air supply is determined by saturating the air and removing all free moisture at the apparatus at a definite temperature. This dewpoint will

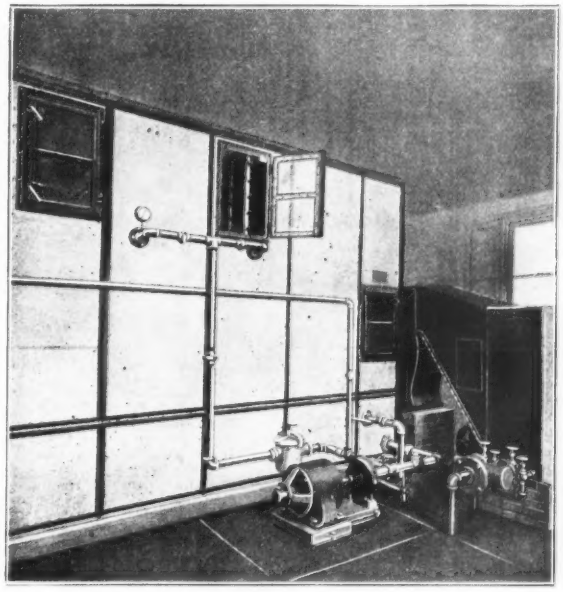


Fig. 9. General View of Dehumidifier.

evidently remain constant regardless of subsequent variations in air temperature. It may be shown that the percentage of relative humidity in an enclosure is dependent upon the difference between the dewpoint temperature and the room temperature and that it is substantially constant for any variation in room temperature so long as the difference between the dewpoint and room temperatures is maintained constant (Tables 1 and 2).

It is evident that this system is particularly adapted to thermostatic control of (*a*) the dewpoint (saturation temperature at the apparatus) and the room temperature independently; (*d*) of the dewpoint with reference to a variable room temperature; or (*c*) of the room temperature with reference to a variable dewpoint temperature. System (*a*) is generally applied to air washers and humidifiers under winter conditions, where the outside temperature is considerably lower than the room temperature and to dehumidifiers where it is possible to maintain a definite dewpoint temperature throughout the entire year. Outlets in the dewpoint air-conditioning are shown in Fig. 11.

However during summer conditions the saturation

point at the apparatus will frequently and unavoidably be higher than the required minimum dewpoint. Under such variable temperature conditions it is necessary to control temperature with reference to the dewpoint according to system (c), and a humidifier is employed to give the air complete saturation under these conditions. One of the forms of differential thermostats which will be described later effects this control.

TABLE 1 DEWPOINT TEMPERATURES AND TEMPERATURE DIFFERENCES REQUIRED IN CARRIER SYSTEM OF HUMIDIFYING FOR VARIOUS PERCENTAGES OF HUMIDITY AND ROOM TEMPERATURES

Room Temperature Deg.	Percentage Relative Humidity																			
	85		80		75		70		65		60		55		50		45		40		35	
	Dewpoint Temperature	Difference Between Dewpoint and Room Temperature	Dewpoint Temperature	Difference Between Dewpoint and Room Temperature	Dewpoint Temperature	Difference Between Dewpoint and Room Temperature	Dewpoint Temperature	Difference Between Dewpoint and Room Temperature	Dewpoint Temperature	Difference Between Dewpoint and Room Temperature	Dewpoint Temperature	Difference Between Dewpoint and Room Temperature	Dewpoint Temperature	Difference Between Dewpoint and Room Temperature	Dewpoint Temperature	Difference Between Dewpoint and Room Temperature	Dewpoint Temperature	Difference Between Dewpoint and Room Temperature	Dewpoint Temperature	Difference Between Dewpoint and Room Temperature	Dewpoint Temperature	Difference Between Dewpoint and Room Temperature
65	60.5	4.5	58.8	6.2	56.75	8.25	54.75	10.25	52.8	12.2	50.7	14.3	48.3	16.7	45.8	19.2	43.0	22.0	40.0	25.0	36.75	28.25
70	65.4	4.6	63.5	6.5	61.6	8.4	59.6	10.4	57.5	12.5	55.3	14.7	53.0	17.0	50.5	19.5	47.5	22.5	44.5	25.5	41.0	29.0
75	70.1	4.9	68.25	6.75	66.3	8.7	64.3	10.75	62.25	12.75	60.0	15.0	57.75	17.25	55.25	19.75	52.75	22.75	49.0	26.0	45.5	29.5
80	74.8	5.2	73.2	6.8	71.2	8.8	69.25	10.75	67.2	12.8	64.8	15.2	62.3	17.7	59.75	20.25	56.75	23.25	53.5	26.5	49.75	30.25
85	79.75	5.25	78.0	7.0	76.2	8.8	74.1	10.9	71.75	13.25	69.4	15.6	66.9	18.1	64.25	20.75	61.25	23.75	58.0	27.0	54.2	30.8
90	84.75	5.25	83.0	7.0	80.9	9.1	78.8	11.2	76.7	13.3	74.2	15.8	71.6	18.4	68.75	21.25	65.75	24.25	68.55	27.5	59.0	31.0
95	89.7	5.3	87.8	7.2	85.75	9.25	83.6	11.4	81.3	13.7	78.8	16.2	76.25	18.75	73.35	21.65	70.3	24.7	67.0	28.0	63.2	31.8

Automatic Humidity Control.

In many industrial installations where humidifying or dehumidifying systems are used, some means of positively and accurately maintaining the proper temperatures and humidities is essential. While much can be accomplished by hand regulation, this would require the constant attention of a highly skilled operator, which in most instances is impracticable. In many processes of manufacturing, as, for example, the weaving of silk and in the conditioning of tobacco for the manufacture of cigars, a uniformity of humidity conditions is quite as essential as the quantity of moisture, as any variation in humidity, either above or below a standard, reduces the output and causes lack of uniformity in the product. In many cases a sensitive automatic humidity control is as important as some means of humidifying. There are three distinct methods by which such automatic control can be secured:

a. By two separate thermostats, one, *D*, is placed at the humidifier behind the eliminator at *A* (Fig 2, page 185, March 2nd issue. This controls the heat of the dewpoint, by an automatically operating valve or damper, governing a means of varying the temperature of the spray water, of the entering air, or of both in conjunction. The other thermostat, placed in the room where the humidity is controlled, maintains a constant room temperature, either by controlling the temperature of the air entering the room, or by controlling some source of heat within the room. With these two temperatures maintained constant, the percentage of humidity in a room will remain constant and will depend upon the difference between the dewpoint temperature maintained at the humidifier and the temperature maintained in the room, as previously shown in Table 1.

TABLE 2 HEAT REQUIRED TO CONDITION 1000 CU. FT. OF AIR (MEASURED AT 70 DEG. FAHR.) FROM VARIOUS ENTERING WET-BULB TEMPERATURES TO VARIOUS DEWPOINT TEMPERATURES

Wet-Bulb Temperature of Entering Air	At 70 Deg. Fahr., 30 Per Cent Humidity, Dewpoint 37.25 Deg. Fahr.			At 70 Deg. Fahr., 40 Per Cent Humidity, Dewpoint 44.5 Deg. Fahr.			At 70 Deg. Fahr. 50 Per Cent Humidity, Dewpoint 50.5 Deg. Fahr.		
	Sensible Heat	Latent Heat	Total Heat	Sensible Heat	Latent Heat	Total Heat	Sensible Heat	Latent Heat	Total Heat
−10	856	338	1194	981	471	1452	1086	567	1653
0	673	311	984	802	444	1246	907	540	1447
10	480	270	750	622	403	1025	730	498	1228
20	307	203	510	443	336	779	510	433	983
30	200	100	300	263	233	496	370	330	700
40				82	96	178	190	194	384

Wet-Bulb Temperature of Entering Air	At 70 Deg. Fahr., 60 Per Cent Humidity, Dewpoint 55.3 Deg. Fahr.			At 70 Deg. Fahr., 70 Per Cent Humidity, Dewpoint 59.6 Deg. Fahr.			At 70 Deg. Fahr., 80 Per Cent Humidity, Dewpoint 63.5 Deg. Fahr.		
	Sensible Heat	Latent Heat	Total Heat	Sensible Heat	Latent Heat	Total Heat	Sensible Heat	Latent Heat	Total Heat
−10	1161	699	1860	1243	801	2044	1310	935	2245
0	991	672	1663	1066	774	1840	1131	908	2039
10	814	631	1445	888	733	1621	965	867	1822
20	635	565	1200	710	667	1377	779	802	1581
30	457	452	930	532	565	1097	600	700	1300
40	276	327	603	343	430	783	423	564	987
50	83	137	220	154	240	394	344	375	619
60							63	118	181

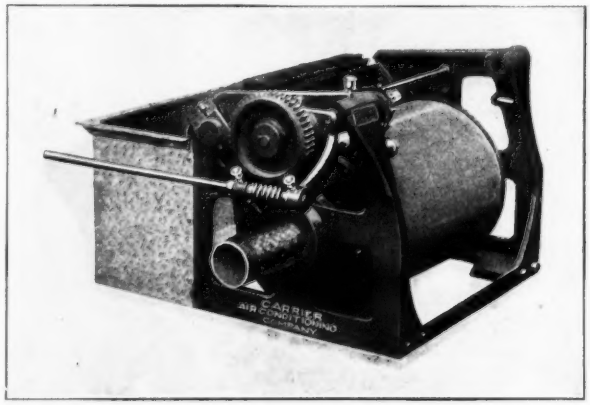


Fig. 10. Rotary Strainer.

b. By a differential thermostat either of the form shown in Fig. 12, or as shown in Fig. 14. This type of dewpoint control is required wherever it is impracticable to maintain either a constant dewpoint or a constant room temperature. In this method there are two elements, one of which is exposed to the dewpoint temperature, while the other is exposed to the room temperature. They are so connected that they act conjointly upon a single thermostatic valve connected with operating motors arranged to control the dewpoint temperature in relation to the variable room temper

ature, or to control the room temperature with respect to the variable dewpoint temperature.

c. By means of some form of differential hygrostat as shown in Figs. 17, 21 and 22. This controls the wet-bulb temperature with respect to the dry-bulb temperature, so as to maintain a constant relative humidity without regard to the dewpoint or variation in room temperature.

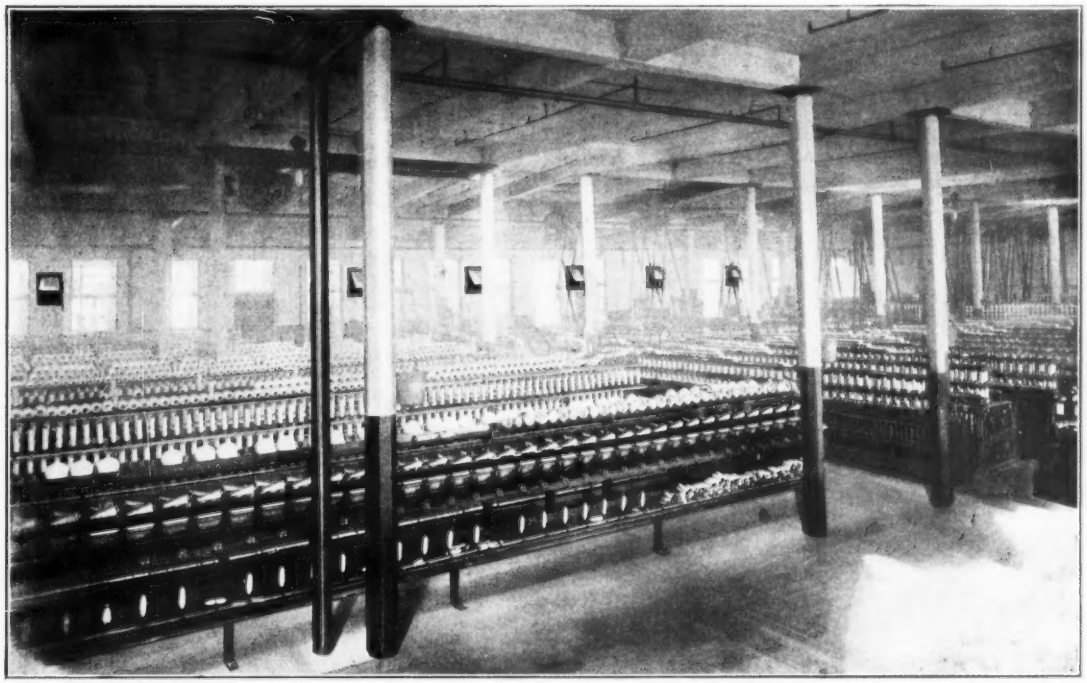


Fig. 11. Spinning Room, Showing Outlets in Dewpoint Air-Conditioning Systems.

Dewpoint Thermostat.

The type of thermostat usually employed in maintaining a constant dewpoint is shown in Fig. 12. This consists of an outer expansive member *A*, usually brass, and an inner non-expansive member *B* of nickel steel. These two members are firmly connected at the end *C*. The other end of the inner member *B* is provided with a bronze valve *D*, ground to fit the adjustable valve seat *E*, supported by the member *A*. Compressed air is admitted through the connection *F* to the annular chamber *G* between the inner and outer tubes. As the outer member expands the valve *D* recedes from its seat, allowing the compressed air to escape into the outlet connection *H*, which connects with the diaphragm valve controlling the temperature of the spray water, so as to reduce the temperature of the dewpoint. When the dewpoint temperature falls below the point desired, the outer member contracts, closing off the air supply to the diaphragm valve, connected to *H*, and the air pressure to the diaphragm motor is released through the adjustable vent *J*. This vent allows an air leak varying with the pressure on the diaphragm motor. Therefore the relation of the area of opening through the valve *D-E*, to the constant area of the vent opening *J*, determines the graduated pressure on the diaphragm motor, at any instant. This is found in practice to give a very sensitive as well as positive control.

The differential thermostat shown in Fig. 13, resembles the dewpoint thermostat in many features of construction, except that it consists of two expansible members operating conjointly, instead of one. The outer member *A* is subjected to the dewpoint temperature at the humidifier, while the inner member *B* is subjected to a strong current of air drawn from the room to be conditioned by means of an aspirator or fan, through an insulated tube. The two members are insulated

Metallic Differential Thermostat.

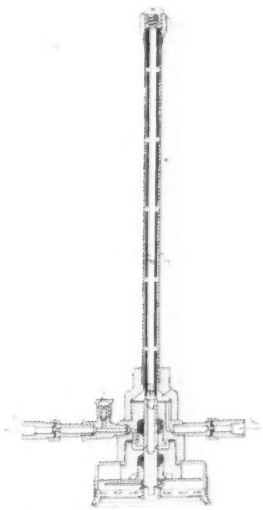


Fig. 12. The Dewpoint Thermostat.

from each other by an annular space *C*, filled with mineral wool. These two members are connected at the base *P* and act conjointly upon the double-ported valve, *D-E*. Compressed air is admitted to the chamber *M* through the con-

nection F, and passes through the valve E to the chamber J, which is joined by the connection G to the diaphragm motor closing off the supply of heat to the spray water. Whenever the difference between the dewpoint and the room temperature is greater than that for which the instrument is adjusted, by

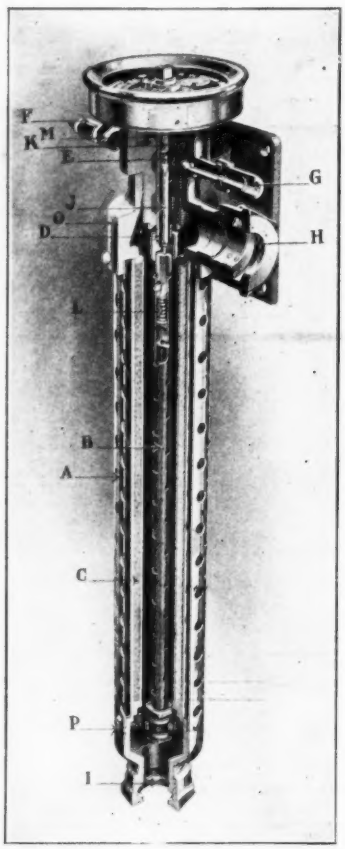


Fig. 13. Metallic Differential Thermostat.

means of the dial, the outer member A contracts with reference to the inner member B. This closes the port E, cutting off from the chamber J the supply of compressed air, simultaneously opening the port D, and allowing the air to escape from the diaphragm valve, which then operates to raise the temperature of the spray water.

The means employed for bringing the sample of air from the room to the thermostat is shown in Fig. 14. The sample of air is drawn through the insulated inner tube, while room air is also drawn through the annular space between this

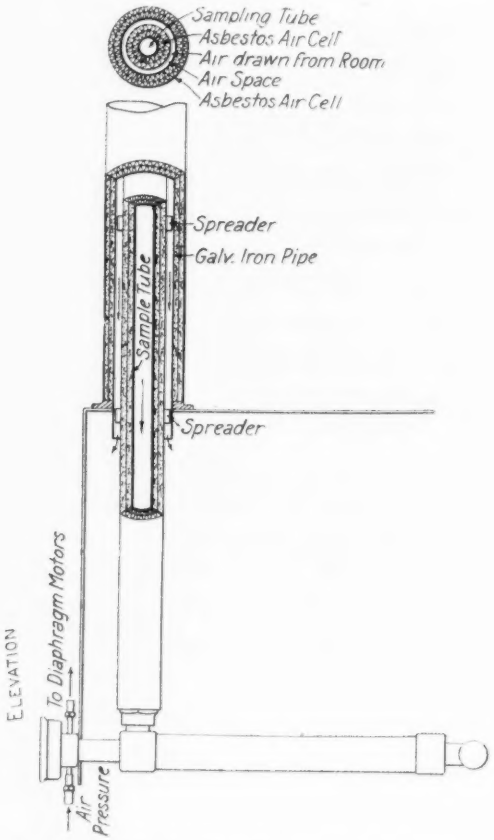


Fig. 14. Sampling Tube of Differential Thermostat.

insulation and the outer pipe by means of a fan draft. This outer tube is also insulated outside of the room. The sampling tube usually connects with the thermostat at H, while the aspirator is connected at I.

(To be Continued.)

Pencillings from Different Parts of the Country

Ames, Ia.—E. C. Wonderlich, formerly of Boone, Iowa, but now of Ames, has purchased the heating and plumbing business of E. R. Moore.

Bismarck, N. D.—The contract for plumbing, heating and ventilating the new Northern Pacific Hospital at Glendive, Mont., has been awarded to Grambs & Peet of this city. The new hospital is to be a five-story building, 42x138 ft. The contract has also been given them for plumbing, heating and ventilating the new federal building at Bismarck.

Cumberland, Wis.—Victor H. Nedvidek and Hans Peters have formed a copartnership and will engage in the plumbing and heating business in the Comstock building.

Springfield, Ill.—The Patterson-Stewart Co., plumbers, will move from 210 N. 5th St. to the Leland Annex, occupying the west room of the five store rooms into which the first floor of the building will be turned, having leased it for a period of ten years.

Sioux Falls, S. D.—Clifford Smith, formerly of Polo, Ill., has recently been appointed city plumbing inspector of this city.

Sheridan, Pa.—P. J. Montague has sold his interest in the plumbing firm of Lichenstein & Montague, 918 Wiley avenue, Pittsburgh, Pa., and opened an up-to-date plumbing establishment here. He reports a number of new jobs on hand and several in view.

What the Law Decides

Recent Court Decisions of Interest to the Plumbing and Heating Trade, Handed Down in Nebraska, Maryland and Florida

Contracts Secured Through Others.

The Supreme Court of Nebraska holds, that where for example, a company that is a wholesale dealer in plumbing and heating supplies and water-supply systems, knows that one of its salesmen has, upon a promise of compensation to be paid, solicited retail merchants in another city to secure customers for it, and, in response to a letter from them to the effect that the time is ripe to get hold of some business and to send a salesman, sends an employe, who assumes in its name to make contracts with householders for the installation of heating plants and water plants, and agrees for his principal to pay the local merchants for material furnished and money advanced while the plants are being installed and to pay a commission, and, before the work is completed, the wholesale merchant company is told the facts about the contracts, and it makes no objection thereto, but sends mechanics to install the plumbing and furnaces, and avails itself of the services rendered and money furnished by the retail merchants, it will be held to have at least granted the agent ostensible authority to make the contracts.

In such a case the wholesale dealer cannot maintain an action in conversion against the householders or the retail merchants for materials furnished by it. If, as a matter of fact, the agent was not authorized to make the contracts, and because of his assumption of power to do so his principal was damaged, he would be liable in damages to it. But the purchasers and the retail merchants could not, over their objection, be sued jointly with the agent because of the transactions.

The apparent authority of an agent which will bind his principal is such authority as the agent appears to have by reason of the actual authority which he has. Ostensible authority to act as agent may be conferred if the party to be charged as principal affirmatively or intentionally, or by lack of ordinary care, causes or allows third persons to trust and act upon such apparent agency.

Contracts and Extras.

In a suit between a property owner and a contractor who had undertaken to do certain work, including the installation of two bathrooms, the Supreme Court of Nebraska makes several practical suggestions about contracts. The court says, Sabin vs. Cameron, 133 Northwestern Reporter, 422, that some written contracts are to be construed solely by reference to their terms, but there are contracts which should be interpreted in the light of outside evidence to ascertain the things upon which the minds of the parties met. The rule admitting the use of outside evidence to explain the terms of a written contract does not apply, however, to those terms of a written contract which have a plain and unmistakable meaning, and are so connected with the remaining parts of the contract that they require no interpretation, but speak plainly for themselves. Nor, in an action to enforce the contract, does this rule open the door for the reception of oral evidence to show that, before the contract was signed, the parties talked about items plainly without the terms of the contract as written. In this case, for example, whether the glass for the bathroom windows should be plain or chipped was not clear from the contract, which left that point open for outside explanation.

Furthermore, the court holds that a builder ordered by the proprietor to do work in some way connected with the original contract, but substantially independent of it, under such circumstances that the owner should know that the execution of his orders will cause extra trouble and expense to the builder not contemplated by the terms of the contract to build, has a just demand for reasonable compensation for the extras if the original contract does not provide to the contrary.

Acceptance of Heating Plant.

In affirming a judgment for the plaintiff in an action brought to recover for furnishing and installing a low-pressure steam heating plant, which was to be done for $700, the Court of Appeals of Maryland holds, Turner vs. Egan, 81 Atlantic Reporter, that it could not be said that the plaintiff could not recover unless he could show that the work had been done in strict conformity with the contract even though the work as performed and the material as supplied had been accepted by the defendant. If after work is done, though not pursuant to the contract, the party for whom it is done accepts it, he should pay for it what it is worth. In this case the contract had confessedly been performed, but the contest was over the manner of its performance. The work it was conceded had been done, but the question was whether it had been skillfully done. The defendant accepted the work, and used the heating plant during the fall and winter of 1910. The plaintiff was entitled to recover for the plant.

Position of Creditor Receiving Property.

A person who receives property from an insolvent debtor in payment of an antecedent debt, the Supreme Court of Florida, Division A, says, in Baldwin vs. Company, 56 Southern Reporter, 943, occupies a more favored position than a purchaser for a present consideration. A preferential transfer of property cannot be declared fraudulent as to other creditors, although the debtor in making it intended to defeat their claims, and the creditor had knowledge of such intention, if the preferred creditor did not actually participate in the debtor's fraudulent purpose. If the only purpose of the creditor is to secure his debt, and the property is not worth materially more than the debt, the transaction is not fraudulent; and this is so, although the creditor knows that the debtor is insolvent, and that the transfer is of all the debtor's property, that there are other creditors, and the debtor is actuated solely by a desire to defraud his own creditors, and that the effect of the debtor's action will be to defeat them. But the creditor must act in good faith; for, if he takes the conveyance for the purpose of aiding in the fraud, it is void.

News of the Wholesalers and Their Products

Pittsburgh Valve and Fittings Company Erects New Foundry Building at Barberton, O.—American Thermostat Co. Reorganized—Other News of Personal and Business Interest in the Trade

ERECTING NEW FOUNDRY BUILDING AT BARBERTON, O.

The Pittsburg Valve & Fittings Co. is erecting a new foundry building at Barberton, O., which will be devoted principally to the grey iron fitting business. This addition is of steel construction 62x650 feet and is being equipped with the most modern foundry equipment. The company expects to be able to occupy the new building about April 15th.

C. T. HAM MFG. CO. TO MANUFACTURE GAYLORD PLUMBING SPECIALTIES.

The C. T. Ham Mfg. Co., 71 Parkway, Rochester, N. Y., has taken over the complete line of sanitary water saving specialties of the Gaylord Sanitary Mfg. Co., of that city. The line includes high-grade water closet combinations, automatic urinals, flush meters, etc. E. P. Gaylord has connected himself with the company as manager of its sanitary department and will devote his time to marketing its line of flushing devices and the Gaylord carriage washer.

AMERICAN THERMOSTAT COMPANY RECENTLY RE-ORGANIZED.

The American Thermostat Co., of Elmira, New York, manufacturers of the "Marvel" thermostat, was recently re-organized with A. S. Bevens as president, F. F. Aldridge as vice-president and I. M. Baldwin as secretary and treasurer. The re-organized company in placing the "Marvel" thermostat on the market, is calling attention to the "Marvel" electric motor which derives its power from four dry cells. The only attention this motor requires after installation is lubrication and fresh dry cells once a year. It is an absolutely dependable automatic motor which requires no other attention during the entire heating season, and eliminates entirely the pulling up of weights or winding of springs. The new American Thermostat Company already feels that its "Marvel" thermostat will be a big success in the heating trade.

MOLINE CO. NOW HAS CHICAGO REPRESENTATIVE.

The Moline System Heating Company of Moline, Ill., announces that it has appointed Mr. H. G. Thomas, with temporary quarters at Lake Forest, Ill., as its sales representative in Chicago and vicinity. It is needless to say that the Moline Company is indeed fortunate in making such a valuable connection. Mr. Thomas has been in charge of the heating business in J. E. Fitzgerald's office for several years and is an engineer and inventor of considerable ability. Many Chicago architects and heating contractors will be pleased that the Moline Company is to have a representative to personally look after Moline interests. Mr. Thomas' headquarters will eventually be moved from Lake Forest to the Chicago business district.

PERSONAL MENTION.

Louis P. Ertle, who was until very recently connected with the Standard Mfg. Co., of Pittsburgh, Pa., in the capacity of representative among the architects, has accepted a position as sales-manager with the McVay & Walker Co., of Braddock, Pa.

Geo. M. Frack has recently connected himself with the Cleveland Plumbing Supply Co., of Cleveland, O., and will call on the plumbing trade in Northern Ohio and Western Pennsylvania. Mr. Frack has covered this territory for the Sanitary Co., of Cleveland, and has a wide acquaintance with the trade.

THE "HANDY JOHNSON," A NEW DIE STOCK.

O. A. Johnson & Sons, 6522 Winchester Avenue, Chicago, recently began the manufacture of a new die stock which will be known to the trade as the "Handy Johnson." This is a multiple die stock, holding dies for cutting four different sizes of pipe, without a change of dies or guides. This is a point the manufacturers claim to be a die stock feature which practical men have sought for many years. The dies when once placed in the tool need not be removed until worn out, so there is no possible way to misplace them, thus eliminating entirely the necessity for guides.

CHICAGO CITY HALL PUBLIC COMFORT STATION BOOKLET.

The L. Wolff Co., of Chicago, has issued a booklet showing the installation in connection with the Chicago City Hall public comfort station. This station, which is the first of any importance in the city of Chicago, was opened to the public on October 16, 1911, and came as the culmination of years of study and investigation in this country and in Europe on the part of the municipal authorities. All the most approved features of the various types and designs have been embodied in the construction of this station, and the result has been the most up-to-date comfort station of our day. All of the plumbing fixtures of this public comfort station were made by the Wolff Manufacturing Co., and the booklet which it has issued should prove of interest to the entire plumbing trade as well as to other people.

INTERESTING AND ARTISTIC TRADE LITERATURE.

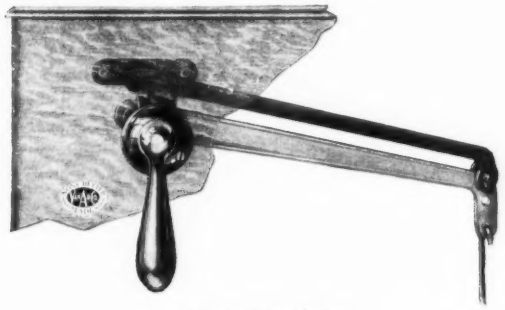
The N. O. Nelson Manufacturing Co., of St. Louis, Mo., and Edwardsville, Ill., is mailing to the trade an illustrated booklet showing photographic reproductions of school buildings and institutions in which the Nelson plumbing fixtures have been installed. Another booklet issued by the same concern contains a comprehensive review of the necessity for positive methods of toilet room ventilation in all public buildings. There is also described the manufacturers' systems and appliances for carrying out all their original ventilating ideas.

SUPPLEMENT TO CATALOGUE "B." OF THE PEERLESS SELLING CO.

The Peerless Selling Co., of Evansville, Ind., is providing the trade with a 32 pp. supplement to Catalogue "B." This supplement was made necessary by reason of new products of its manufacture, and is mainly an introduction of the Peerless Selling Company's automatic seat operating water closet combinations. These new products indicate the continual progress of this manufacturing concern.

A FEATURE OF VAN ARNAM CONSTRUCTION.

The Van Arnam Mfg. Co., of Ft. Wayne, Ind., has found the "Ezypush" lever (a photographic reproduction of which is shown herewith) to be a trade-winning feature of their closet combination. The "Ezypush" lever has now been on the market long enough to win for itself a host of enthusiastic friends in the plumbing trade.

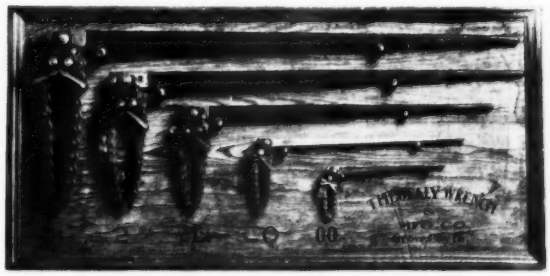


The "Ezypush" Lever.

As its name signifies, it is easy to operate by pushing the handle either to right or to left. Many plumbers have called this feature to the attention of their prospective customers in a way that has produced sales. The illustration of the "Ezypush" lever shown herewith indicates that the construction is heavy but simple, and that there is nothing to get out of order, making the lever a most efficient feature in connection with the manufactured combinations.

THE GEALY WRENCH AS DISPLAYED BY JOBBERS.

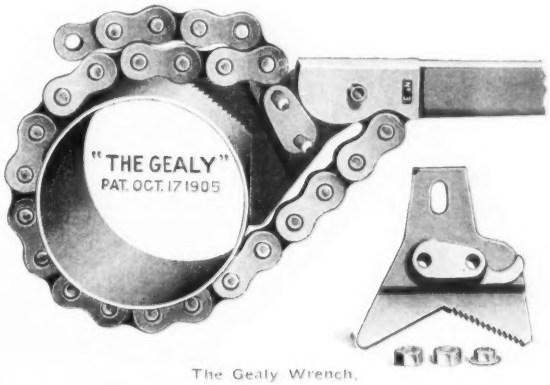
The Gealy Wrench Mfg. Co., of Grove City, Pa., provides jobbers with a convenient display arrangement as shown by a photographic reproduction of display board



The Gealy Wrench Display Board.

in this column. These display boards are provided to all jobbers carrying the Gealy line of wrenches. This arrangement is one of the most successful on the market.

The distinctive features of the Gealy wrench to which the manufacturers call the attention of the trade are: The positive grip action; double jaws with chain which distributes pressure equally; chain fastened on one side of pipe to handle, on other side to loose jaws, insuring instant release; slot in jaws allowing handle bolt to



The Gealy Wrench.

work freely with action of cam-lever, thus there is no bolt to break; the cam-lever principle gives instant release by jerk of chain. These are some of the features of the Gealy wrench on which the manufacturers base their guarantee.

THE "SI-WEL-CLO" NOISELESS CLOSET COMBINATION.

Realizing that success in general magazine advertising of plumbing goods must depend largely upon the plumbing trade knowing what is going on, The Trenton Potteries Co., of Trenton, N. J., is at present directing the trade's attention to the "Si-wel-clo" noiseless closet.

This company is spending its money to make the general public thoroughly acquainted with this closet combination. Its campaign is meeting with success and only the plumber's co-operation is needed to make the sale of

The "Si-wel-clo" Closet Combination.

this noiseless closet unprecedented. The "Si-wel-clo" can be purchased through any plumbing supply house in the country, a large majority of whom have the fixture in-

stalled under water in their showroom. The Trenton Potteries Co. would appreciate prompt notification if any plumber cannot obtain it.

Because of the special tank and fittings including the high pressure ball cock, it is best to secure the "Si-wel-clo" combination complete. There is nothing freakish about it. It has a special feature but not visible. The company believes that it is the best closet for residential purposes on the market. The demand is ripe and a good profit awaits its sale. Obtain prices and blue prints from your jobber before some customer asks about it. Then you will be ready to quote.

The Trenton Potteries Co. has a pamphlet—"Don't pull the string in the bathroom and register in the parlor" which they will be glad to send to those interested, who write for it and mention "Domestic Engineering."

PENNSYLVANIA STATE ASSOCIATION CONVENTION WILL INCLUDE MANUFACTURERS EXPOSITION.

The annual convention of the Pennsylvania State Association of Master Plumbers, which is to be held at the Hotel Walton, Philadelphia, Tuesday and Wednesday, April 16-17, will undoubtedly be one of the most successful state association gatherings of the year. The organization has provided plans for a successful and economical display by manufacturers who desire to promote their goods during this meeting.

The arrangements of the floor and booth plans for the convenience of the manufacturers, are shown herewith. This arrangement is in a large room adjoining the convention hall of the Hotel Walton, and it is apparent that generous spaces will be provided for all those manufacturers who desire to avail themselves of the exceptional opportunity for display. A freight elevator is located close to the exhibition hall so the exhibits may be easily placed. Spaces are offered for sale by the exhibition committee of the state association and the entire arrangement along this line should prove highly satisfactory.

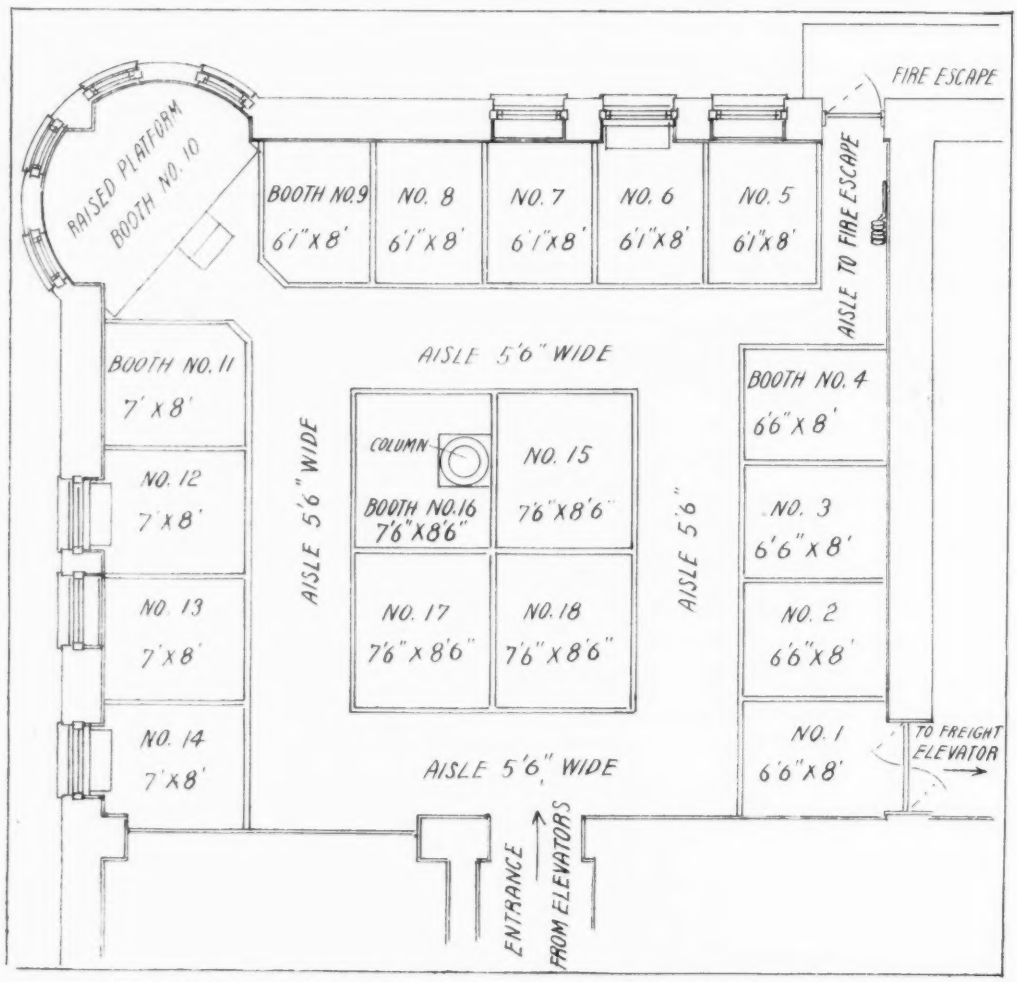


Diagram of Pennsylvania Master Plumbers' Exhibition Room at Hotel Walton, Philadelphia.

MECHANICS OF HEATING AND VENTILATING.

"Mechanics of Heating and Ventilating" is the title of a new work by Konrad Meier, which has just been published by the McGraw-Hill Book Co., New York City, and which proves to be a valuable addition to American heating literature. In the course of 26 years of activity in heating and ventilating, both in this country and abroad, Mr. Meier has accumulated a great amount of data relating to the flow of water, steam and air. All of this is obtainable elsewhere, but widely scattered in various

publications, foreign and domestic, and most of it had never been put into shape for the purposes of heating engineers.

The author has arranged this material for his own convenience and needs in designing apparatus, grouping it into ten charts, each covering a special field, such as gravity hot water heating, and forced ventilation. Each of these charts replaces a series of tables on the subject, but is really more comprehensive and complete, giving at a glance the result of a calculation from any combination of factors.

There is little that is new in the underlying theories, but the graphic method as worked out permits their correct application in practice which is now too often slighted for lack of facilities. The method should be useful not only for special problems, but should also encourage the handling of all propositions in a consistent, rational way, leading to economy and efficiency.

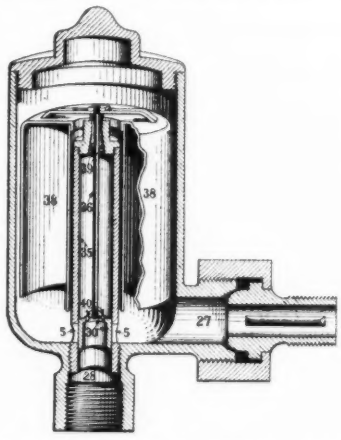
The charts are based on data from the best known sources, used in this form for several years, and are therefore in no sense an experiment. Other engineers have sought and bought the privilege of using them. They are now published in book form to secure the copyright. The text is not a general treatise, but is confined strictly to a short exposition of the mechanics, as applied to heating and ventilating, with examples taken from actual practice.

The book is bound in cloth and contains 161 pages, 6x9 inches, is illustrated with ten large charts, and costs $5 net, postpaid. It can be obtained from the publishers or the Book Dept. of "Domestic Engineering," 445 Plymouth Court, Chicago.

For those who desire the charts for regular use in draughting room and office, separate sets are available, printed on cloth, with lines in different colors, and mounted on boards. Single charts, $1.50. Sets of ten charts, $15.00 net.

IMPERIAL VALVE FOR VACUUM HEATING.

The Imperial Valve Co., Chicago Savings Bank Bldg., Chicago, recently completed the installation of its valve throughout the new Chicago City Hall Square build-



Sectional View of the Imperial Valve.

ing. This fact indicates that the Imperial valve is meeting with decided success and that it is worthy of consideration by any one who is identified with the heating of buildings where the vacuum system is contemplated. Many improvements are embodied in the construction of this valve. It is claimed that a difficult problem is solved by a feature in the construction of this valve which precludes the possibilities of clogging with dirt, grease, etc., that passes through all steam pipes. A sectional view of this value is shown herewith, indicating clearly the construction on which is based the manufacturers' claim for its success.

DATES OF TRADE CONVENTIONS TO BE HELD DURING ENSUING MONTHS.

March 19 and 20, 1912.—The annual spring meeting of the National Association of Brass Manufacturers, at the Hotel La Salle, Chicago. The commissioner of the association is Wm. M. Webster, 1112-1114 Schiller Bldg., Chicago.

March 26 and 27, 1912.—The 20th annual convention of the Michigan State Association of Master Plumbers, at Kalamazoo. The sessions of the convention will be held in the Auditorium, and headquarters will be in the Burdick Hotel. Officers of the state association are: President, Thos. J. Shields, Lansing; vice-president, Geo. McCulloch, Muskegon; secretary, Wm. A. Decker, 132 Canal St., Grand Rapids.

April 16 and 17, 1912.—The annual convention of the Kentucky State Association of Master Plumbers, at Louisville, Ky. Headquarters will be established at the New Galt House, and the sessions will be held at the Master Plumbers' club-room. The officers of the association are: President, J. J. Fitzgerald, Lexington; vice-president, George Shardein, Louisville; secretary-treasurer, W. W. White, 606 York St., Newport, Ky.

April 23 and 24, 1912.—The tenth annual convention of the Oklahoma State Association of Master Plumbers, in Shawnee, Okla. The officers of the association are: President, W. V. Roesch, Shawnee; vice-president, W. F. Black, Enid; secretary, A. D. McMullen, Oklahoma City; treasurer, Walter Newman, Shawnee.

April 23, 24 and 25, 1912.—The annual convention of the Texas State Association of Master Plumbers, at Fort Worth, Tex. The arrangement committee for the convention is composed of the following master plumbers: W. E. Thatcher, chairman; P. E. Fosdick, Fred Robbins, Wm. Blevins and W. H. Payne, all of Fort Worth.

May 7, 1912.—The annual convention of the West Virginia State Association of Master Plumbers, at Clarksburg, W. Va. The officers of the association are: President, W. A. Wiedebusch, Fairmont; secretary-treasurer, E. C. Wiedebusch, Morgantown.

June 10-13, 1912.—The twenty-fourth annual convention of the National Association of Master Steam and Hot Water Fitters, at Atlantic City, N. J. Headquarters will be established at the St. Charles Hotel. The officers of the association are: President, Edward B. Penny, Newark, N. J.; vice president, John T. Bradley, St. Louis, Mo.; treasurer, Juan A. Almirall, New York City; secretary, Henry B. Gombers, New York City; sergeant-at-arms, John C. F. Trachsel, Philadelphia.

July 16, 17 and 18, 1912.—The 30th annual convention of the National Association of Master Plumbers, in Salt Lake City, Utah. The officers of the association are: President, Alfred C. Eynon, Canton, O.; vice-president, Frank J. Fee, New York City; secretary, Louis E. Deuble, 312 N. Market St., Canton, O.; treasurer, William McCoach, Philadelphia.

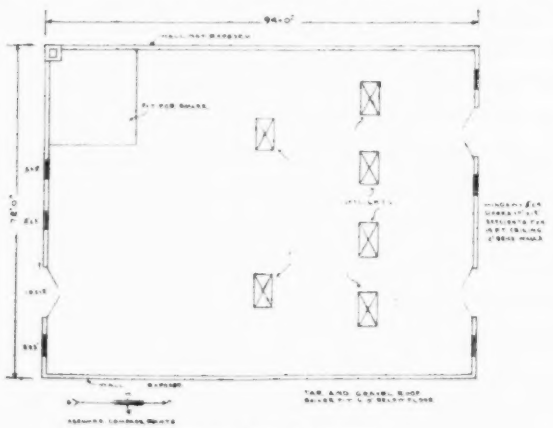
QUESTIONS AND ANSWERS

HOW TO HEAT A GARAGE.

Editor "Domestic Engineering":—Herewith you will find rough sketch of a proposed garage to be heated by steam. Would like you to show by sketch the best lay out for the same showing the sizes of risers, drip returns, valves, also size of boiler and the best method to figure the radiation in such a building. Also let us know which is the most efficient coils, run overhead about two feet from outside wall, or a coil run on outside wall under window or about two feet from floor.

Lawrence, Mass. M.

It is not the intention of "Domestic Engineering" to show completed detailed working plans of heating installations. The following, however, will cover the essential points in the above query. The best method to employ in arriving at the amount of radiation required to heat the building to say, 70 degrees at zero, will be to first ascertain the heat loss from the building, in B. t. u.'s per hour, and then divide this by the efficiency of the pipe coils placed along the walls near the floor. Better results will be obtained by placing the coils along the walls near the floor than will be obtained by placing them near the



How to Heat a Garage?

ceiling, as has been explained in a recent issue of "Domestic Engineering" in answering query regarding the heating of a garage in Montana. We have in the windows and skylights, 273 sq. feet of glass; 360 sq. feet of surface in the doors; 6,272 sq. feet of net exposed roof; and 2,975 sq. feet of net exposed wall. The B. t. u. loss per hour for each degree difference in temperature for the various surfaces is as follows: Glass, 1.23; 12 in. brick wall, .3; doors, .41; asphalt roof, .27. By multiplying the sq. feet of surfaces by the proper factors for B. t. u. loss, we have 3,075 B. t. u. loss from the building per hour for each degree difference in temperature between the inside and outside air. As we have assumed this difference to be 70 degrees, 3,075x70 equals 215,250 as the total B. t. u. loss per hour, and the next step will be to divide this by the efficiency of the pipe coils which will be approximately 290 B. t. u. per sq. foot of surface per hour, with 1 lb. gauge pressure. 215,250 divided by 290 equals approx. 742 sq. ft. To this should be added 10 per cent for heat loss by opening of the doors which will bring the radiation required up to 814 sq. feet. 20 per cent added for exposures will bring the radiation up to 977 sq. feet, 5 per cent added for the additional 2 feet over 12 foot ceiling height, will make the total radiation required under ordinary conditions, approximately 1,025 sq. feet. As the mains can be used as heating surface, it will be well to make one loop entirely around the building, starting east from the boiler room. A fall of 1 inch in 30 feet will give us approx. 10 inches fall in the circuit. It will require a 4 in. main, assuming a pressure drop of ¼ lb., which will easily occur, due to the main acting as heating surface. Approximately 175 sq. feet of the surface in the coils may be eliminated by the main acting as heating surface. While there is more surface than this amount in the 4 in. main, it is not located to give the same efficiency as the coils along the walls near floor, hence the reduction of the coils can not be made equal to the surface in the 4 in. main. Without considering this cut in surface, we should say the coils should be distributed about as follows: 225 sq. feet in one coil on the west wall near the front; 125 sq. feet between the front doors; 125 sq. feet directly opposite this on the south wall; and two 275 sq. foot coils on the east wall. 125 foot coils to have 1½ in. supply valves, the other coils to have 2 in. supply valves, and all the coils to have ¾ in. return valves. Boiler should have a grate capacity of approximately 7 sq. feet, depending of course, upon the fuel to be used; 12 in. smoke pipe; and a 12 in. x 16 in. flue not less than 30 feet in height. The height of the flue will depend upon the conditions surrounding same. Air valves must be placed on all the coils and where the main drops to the boiler. Either automatic or hand-operated may be used. We believe this covers the inquiry.

AMOUNT OF WATER FLOWING THROUGH PIPE.

Editor "Domestic Engineering":—Will you kindly tell me how many gallons of water will flow through a 1¼ in. pipe per hour at a pressure of 40 lbs., and greatly oblige.

Henderson, Ky. S. G. M.

S. G. M. did not give the length of the 1¼ in. pipe and we have assumed it to be 50 feet. If it is any other length the answer can easily be worked out from the formula.

Put in the shape of a question, we have:—How many gallons of water will flow through 1¼ in. pipe, 50 feet long, per hour, with a pressure of 40 pounds. It is understood that the term "40 pounds" means 40 pounds per square inch. Formula.—When the diameter, head, and length of pipe are given, the quantity of water it will deliver in a given time can be found by the following formula:—

$$q = \sqrt{\frac{d^5 \, h \times 4.71}{L}}$$

in which

q = quantity in cubic feet per minute

d = diameter of pipe in inches
h = head in feet or pressure in pounds reduced to head in ft.
L = length of pipe in feet

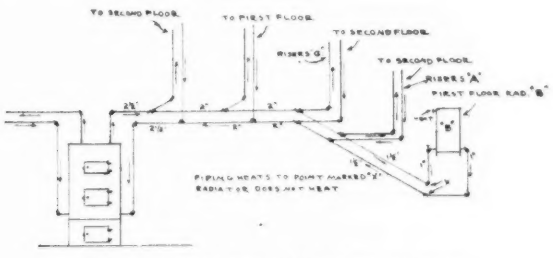
The first step will be to find the fifth power of the pipe size, 1¼ in., and as the number itself is always the 1st power the following operation will be necessary. For convenience we will reduce 1¼ to a decimal, 1.25
1.25x1.25 gives us the 2nd power, this x1.25 gives us the 3rd power, this x1.25 gives us the 4th power, and this x1.25 gives us the 5th power or 2.85 approx. 40 pounds pressure reduced to feet head, gives a column of water 93 feet high to equal 40 pounds, and this is our head. The formula now becomes

$$\frac{\sqrt{2.85 \times 93}}{50} = 2.3 \times 4.71 = 10.833 \text{ cu. ft. per}$$

minute 7½ gallons to the cubic foot, we have 10.833 x 7½ =81.247 gallons per minute and this x60 equals 4,884.82 gallons flowing through the pipe per hour. This is on the assumption that it is a straight pipe, and if there are a number of bends in same, the delivery will be cut down to some extent.

WHY DOES THIS RADIATOR REFUSE TO HEAT?

Editor "Domestic Engineering":—Will you kindly tell me why radiator marked B does not get hot. Pipes (X)



Why Does Radiator "B" Refuse to Heat?

leading to radiator get hot but the heat does not reach the radiator. Kindly suggest how to remedy the defect.
Salina, Kans. K. T.

There are several things that might be the cause of radiator "B" not heating. The air might not be released from the radiator; there might be a stoppage in the piping; the supplies may be too small; or radiator "A", being located on the second floor, may be robbing radiator "B" of the heat. This would cause a "short-circuit" of the water to rad. "A," and we are inclined to believe this is the cause of the trouble. This is partly indicated by the fact that the piping heats up to the point marked "x." This can easily be ascertained, by closing the supply valve to radiator "A," and also radiator "C," and then noting the effect on radiator "B." The fact that radiator "C" and "A" are both on the second floor, confirms the belief that the trouble is due to short circuiting, which will rob the first floor radiator of its share of the heat. It may be that the 1 in. supply is not large enough, but we are unable to say if this is the case, as no radiator sizes being given, this fact bars any remarks along that line. If after shutting off the two top radiators and the radiator heats all right, there are two courses left open; either make the 1 in. supply larger, or restrict radiator "A" and "B" if necessary so as to hold back the circulation from these two radiators and favor radiator "B." This can be done by inserting a copper gasket in the union of the supply valve, which will reduce the water supply. Lack of information bars us from stating the size these holes should be. This is a common complaint in hot water work due to not properly proportioning the piping to the second floor radiation. The above should enable "K. T." to get the radiator to working properly.

THE METAL MARKET

HEALTHY IMPROVEMENT IN THE IRON TRADE.

Production of pig iron showed an increase during February which was as gratifying as unexpected. Steel making irons contributed largely to the increase and in fact, the demand for finished iron and steel is the real cause of the increase in the iron trade and not the foundry branch of the business. The pipe manufacturers are the most conspicuous buyers, one in the Philadelphia district, purchasing 3,000 tons. In and around Detroit the automobile manufacturers have bought rather freely of foundry iron, and more activity is looked for in that district at an early date. Quotations are as follows:

Southern Foundry No. 2 Birmingham	$10.25
Northern Foundry No. 2 New York	14.72
Virginia Foundry 2X Philadelphia	$15.50 to 15.75
Southern Foundry No. 2 Chicago	13.25 to 13.75
Northern Foundry No. 2 Chicago	14.20

COKE.

Users of coke in all markets are getting very anxious about their contracts, and are urging prompt shipments of material. Foundry coke for spot shipment is firm at $2.25 to $2.50, and on contract can be handled at a shade less. Furnace coke is $1.85 to $1.90.

COPPER.

Domestic consumers continue to buy copper rather freely, especially the mills in the Connecticut Valley. Prices have advanced and electrolytic is now quoted at 14.50 cents, at the bottom, while some sellers ask 14.62½ cents. Consumers in Europe are not buying large quantities but are watching the market with care, and awaiting a decided turn in the coal strike situation. The report of the Copper Producers' Association was favorable to higher prices.

Considerably more activity is manifest in the copper producing regions and the reports from copper miners are optimistic.

LEAD.

Prices continue unchanged at 4 cents New York and 3.90 cents St. Louis. The American Smelting & Refining Company is taking practically all of the business at its lower quotation.

SPELTER.

The scarcity of this metal, notably special brands, has been responsible for further advance, and spot is now quoted at 6.90 cents New York.

News of the Plumbing and Heating Contractors

Reports of the Week from Many Different Cities Show Both Business and Personal Activity in the Trade

NEW ENGLAND NOTES.

Massachusetts.

Hinsdale.—F. E. Andrews is moving his plumbing establishment from the Burke block to the Birmingham block.

Amherst.—Charles Dance, of the firm of Charles Dance & Son, plumbers, is seriously ill. The affairs of the concern are being cared for during his illness by Fred W. Dance.

Marlboro.—The school committee has asked proposals for heating and ventilating the new school building on Pleasant street. O. A. Morton is secretary of the committee.

Worcester.—In response to numerous complaints from master plumbers and others, of their inability to reach the plumbing inspection department before 9 in the morning or after 4 in the afternoon, Mayor O'Connell has made arrangements for the department to be available longer hours. In order to bring this about he will appoint John F. McCartney chief inspector and place him in charge of the department.

Boston.—Pierce & Cox, plumbing and heating experts, suffered a slight loss from fire in their establishment on Kingston and Edinboro streets a few days ago. The fire was discovered about 5 o'clock in the morning and gave the guests at the United States hotel, which adjoins, a bad scare.

Greenfield.—The plumbing business of the late Loren B. Haverly has been sold by his estate to F. J. Harris, who will continue the business at the present location on Bank row. F. C. Sear will continue in charge of the establishment.

Springfield.—P. A. Roberts has the contract for the plumbing and J. J. Gubbins for the heating in a new two-family house on Massachusetts avenue for W. D. McKenzie. Work is to be started soon.

Lynn.—The firm of Sawyer & Hall, plumbers, of 516 Chestnut St., has been dissolved, Mr. Hall retiring.

Natick.—Fiske & Co., plumbing contractors, have bought out the business of M. A. Durkee and also the building in which Mr. Durkee was located.

Springfield.—Lane & Dowling have the heating contract and M. Cohen the plumbing for 16 houses which are to be erected on Belmont avenue and Sylvan avenue for William Lay. Four are to be started at once and the others to be built during the spring and summer months.

Boston.—Recent incorporations as recorded at the office of the secretary of state include: The Eastern Seats & Tank Co., Boston, manufacturers and dealers in plumbing specialties; and the Kearney Race Co., Norwood, manufacturers and dealers in plumbing specialties. The former concern is capitalized at $10,000. The incorporators are Allan J. Lloyd, Clarence E. Hill and Jacob H. Roak. The incorporators of the Kearney Race Co., are Edward H. Kearney, Harry W. Race and Edward R. Kearney. The capital is placed at $3,000.

Fall River.—The American Plumbing & Heating Co. has been awarded the contract for installing a new heating plant in the police building.

Lowell.—Demarais & Bourret have the contract for the plumbing and steam heating in a three tenement house on White street for Alfred Sawyer.

Brighton.—The Oak Square Plumbing Co. is now located in new quarters at 563 Washington St.

Turner's Falls, Mass.—Myron A. Ward, who has conducted a plumbing business here for 42 years, has retired from active business. His establishment has been taken over by Kennedy & Schlegel. Mr. Ward settled here in 1870, having learned his trade in Easthampton, Mass., and for nine years his plumbing establishment was located in the old Hotel Block. From there he moved to Third street and remained in that location continuously until his retirement. For many years prior to 1897 George Manchester was associated with Mr. Ward, but in that year he bought out the Manchester interest and for the past 15 years had conducted it alone. Mr. Ward is a veteran of the Civil war and one of this city's most respected citizens.

Lowell.—Welch Bros., a plumbing firm composed of Richard J. Welch, president of the Massachusetts State Association of Master Plumbers, and John F. Welch, celebrated the 12th anniversary of their start in business with a "get-together" banquet for their employes. The gathering was held in the place of business on Middle street which was decorated with flowers and flags and transformed for the time being into an up-to-date dining room. The members of the firm sat at the head of the table and gathered about them were their dozen or more employes. Among the number was a man under whom one of the firm members learned his trade years ago and who is now a valued employe of Welch Bros. It goes without saying that the affair was an enjoyable success.

Connecticut.

New Britain.—Contracts for the erection and other work in connection with the new clubhouse for the New Britain Lodge of Elks, have been let. The heating and ventilating contract has been placed with Parker & O'Connor.

Bristol.—Patrick J. Coleman, one of the oldest master plumbers in the city, is being urged upon the city council as a candidate for plumbing inspector. A petition signed by many prominent men has been submitted to the legislators. Mr. Coleman has been a plumber here since 1886 and formerly had a place of business in Prospect street, but is now retired.

Maine.

Bangor.—S. E. Pomeroy & Co., plumbers and hardware dealers at Hampden Highlands, has built an addition to their store giving better quarters for their plumbing business which is in charge of L. M. Beverly.

New Hampshire.

Dover.—C. E. Ricker of Berwick, Me., has the contract for plumbing and heating a two apartment house at the corner of High and Mt. Vernon streets for C. R. March.

Vermont.

Rutland.—Frank C. Dunn has retired from the plumbing, hardware and heating firm of Dunn Bros., one of the oldest business firms in the city. The concern first started business in 1870 as Dunn & Crampton, was later known as J. W. Crampton & Co., and finally Dunn Bros.

Brattleboro.—J. E. Rogers, who recently took over the plumbing business of John Galvin, has the contract for heating the new Austine Institute building, an extensive job.

NEWS FROM THE PACIFIC COAST.

The month of February proved rather quiet in all lines of business on the Coast, yet the average business was somewhat better than for the same period last year taking it all in all. The valuation of building permits for the month in some cases showed a decided gain over January of this year, and in other cases a slight decrease. The general feeling, however, is most optimistic and the indications are, judging by the great amount of work in the hands of architects, that another month will see the commencement of much really important building.

The building permits issued in San Francisco for February aggregate a value of $1,764,252, which, though it is about one hundred thousand dollars less than for the month of January, is almost $300,000 more than for February, 1911. Oakland's record for February amounts to $515,593 as against $326,712 during January, a most satisfactory gain. The gain over the previous year is also great. Los Angeles shows a falling off for the month, but the large total indicates that this city still is far in the lead in building operations. The permits for February amount to $2,152,963, or about $300,000 less than for January, and over double the sum for February, 1911. San Diego also suffered a slight loss for the month, which was probably due to anxiety over dry weather as much as anything else. The permits for the month are $494,688, or about $33,000 less than for January. The increase over February, 1911, however, is over double. Sacramento issued permits for February amounting to $104,465, or a gain of $10,000 over January's record. Seattle dropped back from $774,815 in January to $443,940 in February. Portland gained over January by $200,000, the total for February being $1,199,861.

This week in the heating, plumbing and ventilating trade shows scarcely any change over last week. In fact business conditions generally have remained about the same since the first of the year. The situation lacks spirit and all seem to be waiting for actual work on the World's Fair to begin. While in the plumbing supply business there has been a normal volume in San Francisco, at least, the profits have been none too good owing to the open market condition prevailing here.

Among the new buildings announced for early construction in San Francisco is an opera house for the Boston & San Francisco Amusement Co., a $125,000 structure to be erected on Market, near Seventh street. The architects, Cunningham and Politeo, have the plans ready for figures and the contracts for excavation and steel work have already been let. Other contracts will be entered into very shortly. In the next two years a sum amounting to $500,000 is to be spent on new buildings for the Wilmerding School of Industrial Arts in San Francisco. One of the buildings is soon to be started.

The authorities of Sanger, Cal., have voted to issue bonds for a new high school building to cost $60,000, the building to be modern and up-to-date in its plumbing and ventilating arrangements.

The Mark-Lally Co. reports a fine business in pumping engines during the month of February. These engines, manufactured by the Associated Manufacturers' Co., of Waterloo, Ia., are to be used for irrigating purposes largely, and their sale was stimulated by the prolonged dry weather which has just passed in this state.

W. W. Montague & Co., has had a record breaking month in its irrigating pipe and well casing department. The pipe plant worked overtime to supply the big demand for sheet metal piping, etc., which came from the country districts. A considerable number of orders for piping also came from the mining districts.

On the three-story building owned by Bert Schlesinger at Pine street and Central place, the contract for the steam heating work has been awarded to the John G. Sutton Co. for $1,120. The contract for the drainage, plumbing, gasfitting and plumbing fixtures for the same building was given to Kiernan & O'Brien for $2,300.

Some time this month the Dalziel-Moller Co., now at 543 Mission St., will remove to larger and better quarters at 560 Mission St. This company owns both buildings. The one it has occupied since the fire of 1906 is a temporary structure. The company will occupy three floors and the basement of the newer building, subletting the remainder.

The State Harbor Board has instructed its engineer to secure plans and specifications for substituting oil for coal as fuel in the Ferry Building in San Francisco, and other State properties. If the plans are adopted the heating plant of the Ferry Building will be run by oil in the future. The change to oil as fuel, it is estimated, will save $10,000 a year.

The plumbing, tinning, and other work, on the two-story building at Capp and Seventeenth streets, owned by L. H. Moller, has been let to Witzellsburger for $4,900.

E. A. Preble, of San Francisco, is to erect a building at Richmond, Cal., which will be used as a hardware store and plumbing establishment.

H. P. Murphy, in the plumbing business at Alameda, Cal., has failed with debts amounting to $524 and assets, claimed exempt, of $1,075.

Sealed bids will be opened this week, it is announced, for the heating and ventilating systems, and other work, for a new grammar school at Stockton, Cal.

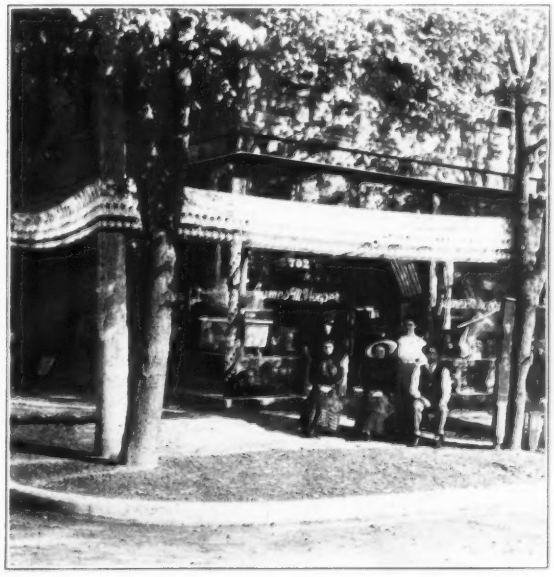
The city council of San Diego, Cal., has accepted the bid of $250 by the United Light, Fuel & Power Co. for a franchise to build and maintain conduits along certain streets for supplying steam for heating purposes. The city is to receive 2 per cent of the gross earnings.

NEW GAS-FITTING INSPECTOR FOR WASHINGTON, D. C.

The Commissioners of Washington, D. C., have approved the recommendation of Alfred R. McGonegal, chief inspector of plumbing, and have appointed Frank Wall as inspector of gas-fitting for the District of Columbia. Mr. Wall has been in the district's service under the plumbing department for nearly three years as a temporary inspector, and the appointment comes to him as a promotion. Mr. Wall fills the vacancy caused by the resignation of Charles E. Matthews, former inspector of gas-fitting.

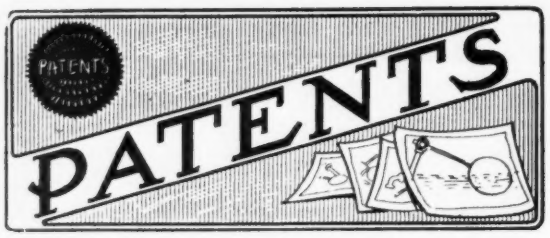
PLUMBING ESTABLISHMENT IN PLEASANT SURROUNDINGS.

It is the exception rather than the rule to find plumbing establishments in so pleasant surroundings as the one shown herewith. This is the home of James M. Hooper's plumbing and heating business at Marshall, Ill., which



James M. Hooper's Plumbing and Heating Establishment at Marshall, Ill.

was founded nine years ago in a small room, 19x30 feet, and has grown steadily until it now occupies a space of 20x122 feet. Mr. Hooper carries pumps as a side line, and with such success that this adds considerably to his profits.



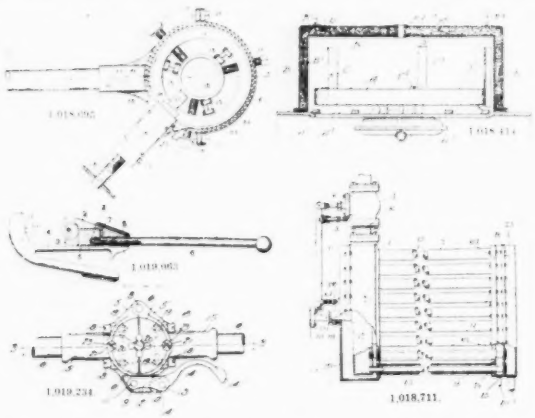
Heating Department.

1,018,695. Pipe-Cutter. Walter H. E. Charpier and Edward Charpier, Chicago, Ill. A pipe cutter including in combination a hollow pipe holder having near one of its ends a series of radially disposed screw threaded openings on its inner portion, a member having a screw-threaded socket in one of its ends and its other end screw-threaded and located in each of said openings of the pipe holder, a screw-threaded bolt located in the screw-threaded socket of each of said members, and a series of screw bolts extended radially through the holder near its other end.

1,018,414. Radiator-Heater. Mark A. Edson, Janesville, Wis., assignor to The Caloric Company, Janesville, Wis. a corporation of Wisconsin. A radiator heater comprising a cylindrical casing open at the bottom and having spaced walls insulated one from the other an open thimble interposed between said walls at the center of one side vertically disposed baffle plates on the interior thereof and pivotally mounted brackets interposed between said baffle plates and adapted to support the casing on the radiator when the shape of the stove does not permit the casing to be carried upon it.

1,019,063. Pipe-Cutter. John R. Long, East Akron, O. A pipe cutter having fixed and movable jaws respectively provided each with a rotary cutter and a slidable holder for the inner of said jaws having a recess lengthwise in its bottom open from the front and in which said inner jaw is adjustable, the said fixed jaw and the said slidable holder being tapered in opposite directions along their outer edges, a yoke confining said parts in operative relations and a handle threaded lengthwise through the lower portion of said slidable holder and rotatably locked in the said slidable jaw.

1,019,234. Stock and Die. August O. Ekorenrud, Seattle, Wash. A stock and die comprising a two-part die stock, a two-part die within said stock and provided with openings having a portion of the walls thereof inclined, a two-part guide, means for securing the guide

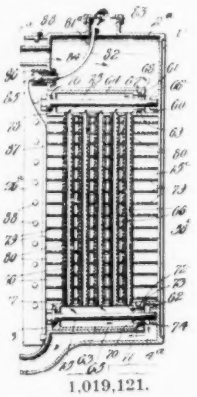


to the die, screws engaging in said stock and having conical heads co-acting with the inclined walls of the openings of the die for adjustably-moving the die and guide parts inwardly, and means carried by the stock and extending at right angles with respect to said screws and positioned upon opposite sides thereof for securing the die and guide parts in adjusted positions and moving the same outwardly.

1,018,711. Water-Heater. William J. Kibby, New York, N. Y., assignor to Spacesaving Appliance Co., a corporation of New York. The combination of a plurality of parallel metal steam pipes, a water pipe of lesser diameter formed of a metal having a higher coefficient of expansion when heated, located inside of each of the first mentioned pipes and fastening means holding the two sets of pipes in rigid relation at one end, a header connecting all the steam pipes at one end, a second header of lesser diameter located inside of the first header and connecting all the water pipes together, inlet and outlet connections for the steam pipes and their header and for the water pipes and their header, a valve in the steam inlet and mechanism whereby the relative motions of the two headers open and close said valve.

1,019,121. Radiator. Jacob B. Beam, Punxsutawney, Pa. A radiator comprising upper and lower water chambers, a frame connecting them; a series of separately removable radiator sections resting on and supported by the top of the lower water chamber and each comprising two heads, connecting tubes and communicating ports between the water chambers and the heads, and means for detachably connecting the radiator sections with the frame.

1,019,450. Pipe-Wrench. Raymond Geoffroy, Arctic, R. I. In a wrench, a handle formed adjacent to its inner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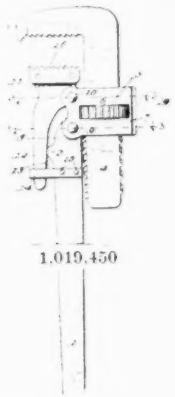
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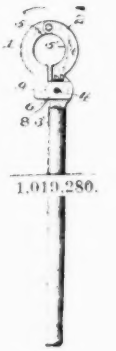
1,019,280.

end with a cam nose, a fitting pivoted to said inner end of the handle, an adjustable jaw carried by the fitting, a jaw for cooperation with the adjustable jaw pivoted to the fitting and having a tail which extends partly along the length of the handle in spaced relation to the front side edge thereof to a point beyond the cam nose, and means to engage said tail to restrict the pivotal movement of the pivoted jaw, said nose riding on the rear longitudinal side edge of the tail.

1,019,280. Pipe-Wrench. Aaron Serfoss, Ashley, Pa. A wrench comprising a fixed jaw having a laterally-extending bifurcated offset, the inner end of the bifurcation of said offset being cut away, a swinging jaw pivotally connected to the fixed jaw and provided in its free end with a pair of sockets, and a handle having a substantially circular head arranged in the bifurcated offset of the stationary jaw and eccentrically pivoted therein, the head of said handle being provided with a pair of teeth adapted to cooperate with the sockets of the swinging jaw to effect movement thereof upon application of pressure to the handle, the cut-away portion of the fixed jaw being so positioned as to engage said handle and limit its movement to such an angle thereto as to always cause the teeth on the handle to engage properly said sockets.

Plumbing Department.

1,018,463. Basin-Cock. Earl G. Watrous, Chicago, Ill. In a basin-cock, the combination, with a casing or body having a tubular upper end, a base flange and a forwardly projecting spout, of a valve controlling the water passage leading through the bottom of the valve casing to the spout, and a combined handle and cap-piece comprising a cup shaped portion fitting over and surrounding and inclosing the tubular upper end of the valve cas-

Story of a Furman Boiler—

A 25 Inch Furman Steam Boiler
Showing Two Intermediate Sections
Front View

UNLESS you know the bit of history back of the Furman Boiler you can't appreciate the position this boiler holds in the minds of heating engineers, architects, and owners.

The history of this boiler dates back more than twenty years. It carries you back to the picturesque little City of Geneva, New York, and the home of a young inventor—Furman by name. "Faultless Furman" he was called by old and young.

Furman had a mechanical turn of mind. He made a study of boilers manufactured at that time. He saw their inefficiency. In his shop he built a boiler. He designed this boiler to extract from every pound of fuel the maximum number of heat units. Just as we create after our own image, so "Faultless Furman" built a faultless boiler.

Furman Boilers were at first manufactured by the Herendeen Manufacturing Company in their agricultural implement factory as a side line. The boilers gave immediate satisfaction. With this satisfaction grew the demand. Within a few short years the manufacture of boilers had supplanted the manufacture of farming implements, and a thriving industry sprang up.

To-day this boiler is built by the United States Radiator Corporation, manufacturers of boilers, radiators and heating specialties. They have made this boiler the best that unlimited money and brains could produce. They have improved the Furman Boiler, making it even more efficient. These boilers are made to-day just as they have been in the past, under the watchful eye of "Faultless Furman" and his son George. The later, like his father, has the inventive turn of mind.

Just as there is character in men, there is character in merchandise. To-day this boiler typifies the best in boiler construction,—because it is built for efficiency and economy in fuel consumption.

The architect or heating engineer who recommends the installation of a Furman Boiler pleases the owner for life because Furman boilers with proper use will last a lifetime.

Our booklet on Furman Round and Furman Sectional Boilers will be mailed to you for the mere asking. Just say "Furman Boiler" on post card and mail it to-day to

UNITED STATES RADIATOR CORPORATION

GENERAL OFFICES: DETROIT, MICH.

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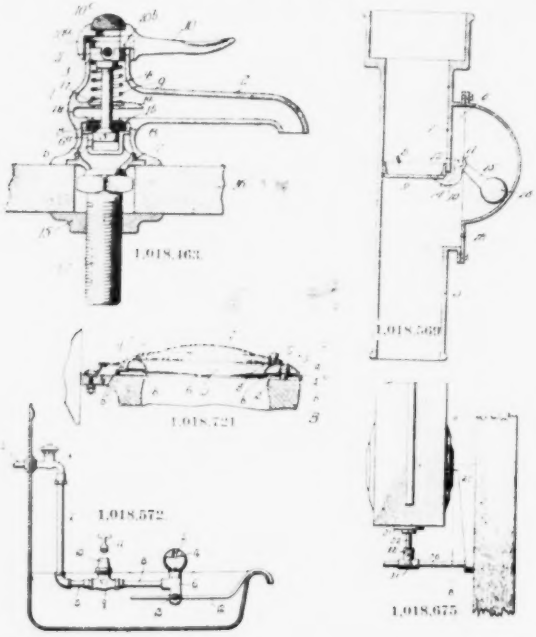
ing and pivoted thereto, and a forwardly projecting handle portion, and means intermediate said combined cap-piece and handle and the valve for causing the depression of the handle to open the valve and permit the passage of water through the valve body to the spout, substantially as described.

1,018,569. Sewer-Trap. Charles Kelty and David P. Joralemon, Elmira, N. Y. In a sewer trap, a seat disposed diametrically thereof, a pivot pin arranged exteriorly of and one side of the seat, a valve having two curved arms pivoted to said pin to swing the valve clear



of the trap at the seat and for cooperating with said seat, a counter weight, a sleeve pivoted to the pin between the arms and movable independently of the valve, the counter weight being connected to said sleeve, and a curved finger of substantially the same length as the arms of the valve formed integral with the sleeve and arranged to engage with the outer face of the valve, whereby the said valve between the arms is held seated.

1,018,721. Closet-Seat. Ralph McCord, St. Louis, Mo. A hollow sectional closet-seat composed of an upper convex member and a plane bottom member coupled thereto and forming a hollow shell therewith, and provided with inner and outer beads at the lines of juncture, the outer bead being offset from the seat by an outer reinforcing shoulder and disposed in a plane exterior to the plane of disposition of the inner bead.

1,018,572. Drinking-Fountain. Louis D. Lawnin, Edwardsville, Ill., assignor of one-half to N. O. Nelson Manufacturing Co., St. Louis, Mo., a corporation. In a device of the character described, the combination with a self-closing faucet, of a fountain nozzle, said nozzle being in the form of a ball provided with a central opening, a nozzle holder arranged below the nozzle and secured thereto, said holder having a depending leg, a pipe for allowing water to pass from the faucet to said nozzle holder, a key-controlled adjustable valve interposed between said faucet and nozzle holder, a rod slidably mounted in the depending leg of the nozzle holder, said rod having a hook-shaped end for the purpose described, and a set screw fitted to the nozzle holder for locking said rod in position.

1,018,675. Meter Support or Shelf. Philip Mueller and Anton C. Schuermann, Decatur, Ill., assignors to The H. Mueller Manufacturing Co., Decatur, Ill., a corporation of Ill. In a meter support, a bracket for securement against a wall and having a portion adapted to serve as an abutment for the meter to space the same from the wall, a supporting member extending outwardly from the bracket below the plane of the abutment, and a seat for the meter carried upon the supporting member and adapted for adjustment toward and from the abutment.

1,018,764. Hose-Rack. Henry J. M. Howard, Washington, D. C.

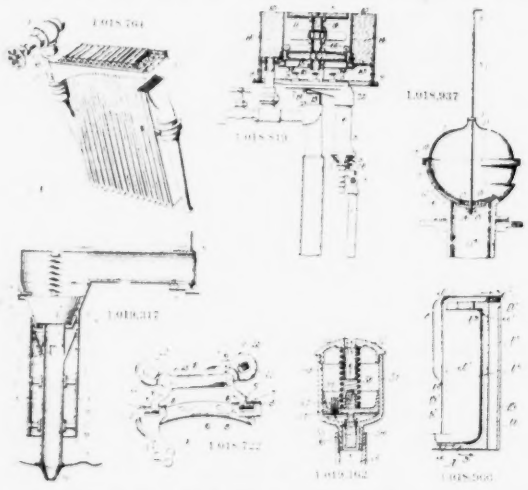
1,018,819. Gas-Burner. Harry E. Gilbert, Conshohocken, Pa., assignor to John Wood Manufacturing Co., a corporation of Pennsylvania. A gasolene vapor burner comprising a cylindrical tube; a foraminous screen formed of a corrugated strip of sheet metal coiled with a plane strip of sheet metal in said tube; a shield at the outlet end of said tube comprising a disk and a standard in concentric relation therewith; said disk and standard being a unitary piece of molded silica; and, means connecting said shield with said screen, comprising a flexible wire molded in said standard extending through said screen and engaged beneath the latter.

1,018,937. Float-Valve. William E. Snaman, Pittsburgh, Pa. A float valve comprising a hollow substantially spherical rigid body-portion formed of two flanged sections, with the flange of one section overlapping the flange of the other section thereby connecting the sections together, the overlapping portions of said flanges extending around and spaced from the lower section of the body-portion thereby providing a recess, a semi-spherical resilient seating member arranged against the lower section of said body and extending in said recess and having its upper portion maintained in position by the overlapping portions of said flanges, a valve stem for said body-portion, and means for securing the lower part of said seating member against said lower section.

1,019,317. Faucet. Alfred E. Goodwyn, Bluefield, W. Va.

1,018,722. Closet-Seat Hinge. Ralph McCord, St. Louis, Mo.

1,019,162. Bubbling Drinking-Fountain. Simeon C. Keith, jr., Somerville, Mass. A self-contained self-regulating bubbling drinking fountain head, comprising a cup-like casing forming a chamber and having at its upper portion a nozzle immovable with respect to the remainder of said casing and provided with a port for the emission of a vertical jet or bubble, an inlet port, and yielding means in said chamber having an area exposed to the pressure of incoming water in said chamber and arranged to regulate the flow of water through said inlet port,



in consequence of which the bubble or jet emitted from the outlet port is of substantially unvarying height irrespective of the pressure of water entering said casing.

1,018,966. Urinal. John A. Davison, Chicago, Ill., assignor to James B. Clow & Sons, Chicago, Ill., a corporation. A urinal having a plurality of stalls arranged side by side, the back and sides of each stall being integral, right-and-left terminal slabs lying against and covering the outer sides of the terminal stalls of the range, said slabs having flanges overhanging the tops and fronts of said outer sides of the terminal stalls.